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"THE COAL TRADE."

BY FREDERICK E. SAWARD.

1877.



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"THE COAL TRADE."

A COMPENDIUM OF VALUABLE INFORMATION

RELATIVE TO

DUPLICATE

Coal Production, Prices, Transportation, etc., at
Home and Abroad, with many Facts
worthy of Preservation for
Future Reference.

CORRECTED TO THE LATEST DATES.

BY

FREDERICK E. SAWARD. *Edward* (ed.)

EDITOR OF THE "COAL TRADE JOURNAL."

Vol. 27
1877.

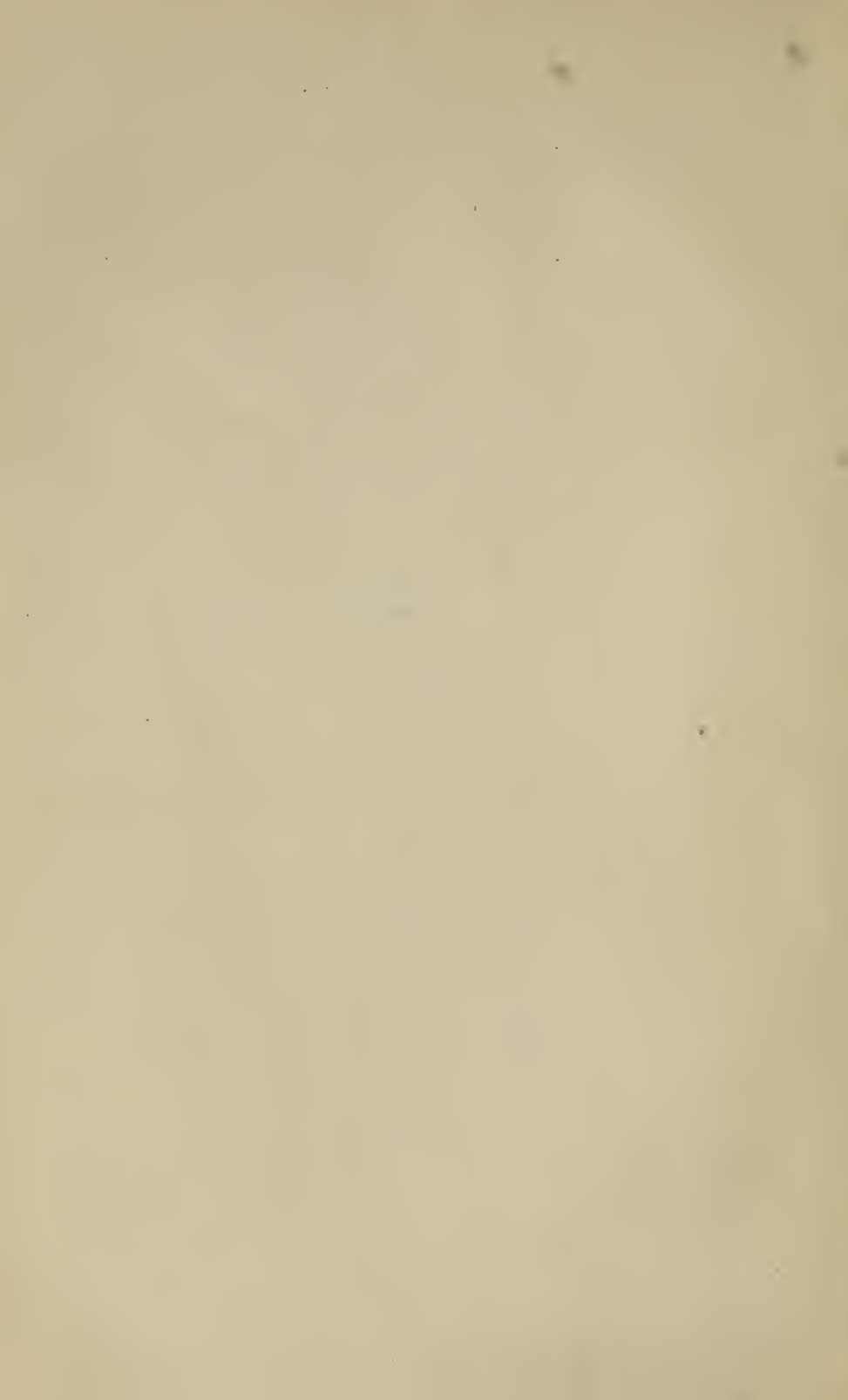
PUBLISHED AT 111 BROADWAY, NEW YORK.

221925
3. 4. 28

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THE COAL TRADE.

INTRODUCTION.

We present to the consideration of the public, facts and figures bearing upon the question of the quantity, price, and transportation of coal. In many instances the tonnages are brought down to the end of the year last past. We ask for the work a continuance of the cordial reception awarded the previous editions. To the many friends, at home and abroad, who have lent us their assistance, we return our sincere thanks.

In America, during the year there was a decreased production of Anthracite, and an increase in that of Bituminous coal; for details our readers are referred to the appropriate pages. Great Britain shows an increasing business for the period under review, as do most of the European countries. The United States is still the second coal producing country of the Globe, the output being say twenty million tons of Anthracite (including district consumption); Bituminous and Semi-Bituminous foots up twenty-seven millions, while Colorado, Wyoming, Utah and the Pacific Slope furnish one million tons of *Lignite* or Brown coal. Nova Scotia does not keep pace with the forward movement in coal production, noticeable in other localities. The grand total of the output in the Globe now amounts to something like two hundred and seventy million tons, of which Great Britain is accredited with over one-half. Australia, India, China and Japan are together furnishing nearly three millions annually. Prussia, France, Belgium, Austria, Russia and Spain show an increased output.

ANTHRACITE COAL.

Anthracite coal is found in an area of about 470 square miles, in Luzerne, Carbon, Schuylkill, Northumberland, Dauphin, and Columbia counties, in the State of Pennsylvania.

We append the following schedule of the production, prepared by Prof P. W. Sheaffer, showing the amount of all the Anthracite coal marketed since the beginning of the industry in 1820, up to 1871.

1820.....	365 tons.
From 1820 to 1830.....	533,194 tons.
From 1830 to 1840.....	5,940,270 tons.
From 1840 to 1850.....	21,893,153 tons.
From 1850 to 1860.....	63,981,807 tons.
From 1860 to 1870.....	114,319,161 tons.
Total from 1820 to 1870 (50 years).....	206,666,325 tons.

From a table prepared by the late Mr. B. Bannan, for the same period, we reproduce the following interesting details :

SCHUYLKILL—Forwarded by Railroad.....	57,494,328 tons.
Forwarded by Canal.....	27,673,744 tons.
LEHIGH—Forwarded by Canal.....	25,490,037 tons.
Lehigh Valley Railroad.....	20,062,168 tons.
L. and S. Railroad.....	3,709,931 tons.
WYOMING—Lehigh Valley Railroad.....	5,914,006 tons.
Delaware and Hudson Canal Co.....	20,825,975 tons.
Pennsylvania Coal Co.....	13,164,550 tons.
Pennsylvania Canal.....	10,624,243 tons.
D. L. and W. Railroad.....	18,320,590 tons.
Lackawanna and Bloomsburg road.....	8,773,233 tons.
Lykens Valley and Short Mountain	2,677,398 tons.
Northumberland County (Shamokin)	6,758,588 tons.
Trevorton	1,017,196 tons.

There are three great divisions—which are named from their locations—the first or Southern, the second or Middle, and the third or Northern coal fields.

The Southern coal field lies principally in Schuylkill county, and hence it is often called the Schuylkill region.

The Mahanoy (often included in the Schuylkill) and Lehigh regions constitute the Middle coal field.

The Northern coal field is in Luzerne county, and embraces what is known as the Wyoming, Lackawanna, Scranton, and Wilkesbarre regions.

In addition to the production reported in our statistics, it is estimated that some 3,000,000 tons are annually consumed in the coal regions, by the engines, workmen, and local enterprises, the returns for which are not furnished.

Production of the three coal fields for a series of years :

Year.	Schuylkill.	Wyoming.	Lehigh.	Total.
1864.....	2,642,218	3,960,836	2,054,669	10,177,475
1865.....	3,735,802	3,256,638	1,822,535	9,652,391
1866.....	4,633,487	3,736,616	2,128,867	12,703,882
1867.....	4,334,820	5,328,312	2,062,446	12,988,725
1868.....	4,414,356	5,990,813	2,507,582	13,834,126
1869.....	4,748,960	6,068,365	1,929,583	13,723,030
1870.....	3,720,403	7,599,902	3,040,303	15,849,899
1871.....	5,124,780	6,481,171	2,249,356	15,113,407
1872.....	5,106,451	9,194,808	3,610,674	19,026,125
1873.....	5,209,156	10,047,241	3,243,168	19,585,178
1874.....	5,891,666	9,445,446	4,404,000	18,980,726

We append comparative details of the business of the last two years :

	1876.	1875.
LEHIGH: By Lehigh Valley Road.....	2,872,211	2,286,242
C. R.R. of N. J.....	1,467,937	1,111,715
D. & H. Branch of Pa.....	41,736	69,887
WYOMING: By Del. & Hudson Co.....	2,006,509	3,056,479
D. L. & W. R.R. Co.....	2,054,019	2,970,693
Pa. Coal Co.....	1,086,475	1,368,207
C. R.R. of N. J.....	1,422,279	1,549,930
Lehigh Valley R.R.....	964,100	936,921
Pa. & N. Y. R.R.....	26,862	88,246
Pa. Canal.....	407,522	299,267
SCHUYLKILL: By Philadelphia & Reading.....	4,935,401	4,780,693
Shamokin.....	587,274	788,034
Williamstown, etc.....	564,342	768,973

The Anthracite coal trade passed through a varied experience during the year 1876; in the early part dullness from the inability to market coal at the high prices made by the combination, in the summer months a continuance of this depression with much cutting in prices. In August the compact came to a sudden ending, prices were much lower, but a heavy tonnage was done during the ensuing three months, after which the trade was very dull, and unsatisfactory, with low rates, and small tonnage the order of the day. Coastwise freights ruled very low during the year, only appreciating to anything like paying prices, during the months of November and December. The rates of tolls, charged by carrying companies, during the year, conformed to the prevailing condition of trade, in so far as they advanced, as prices advanced, and did not recede until the break occurred in the autumn, so that the individuals who kept up mining, were compelled to pay a high rate of toll, while the prices were being cut, by parties working with the companies.

LEHIGH VALLEY RAILROAD COMPANY.

Statement of the total coal tonnage, together with the tonnage east of Mauch Chunk, from the year 1855 to date:—

Coal tonnage east of Mauch Chunk.			Coal tonnage east of Mauch Chunk.		
Year.		Total Coal tonnage.	Year.		Total Coal tonnage.
1855 (3 mo.).....	8,482	8,482	1866	1,730,474	2,037,714
1856.....	165,740	165,740	1867	1,948,385	2,080,156
1857	418,235	418,235	1868	2,225,630	2,603,102
1858	471,029	471,029	1869	2,015,296	2,310,170
1859	577,651	577,651	1870	2,810,020	3,608,586
1860	730,641	730,641	1871	2,210,272	2,889,074
1861	743,671	743,671	1872	3,009,395	3,850,118
1862	882,573	882,573	1873	3,189,023	4,144,339
1863	1,195,154	1,195,154	1874	3,016,636	4,150,659
1864	1,295,419	1,466,794	1875	2,417,800	3,277,571
1865	1,402,276	1,687,462	1876	3,129,895	3,951,513

The year ends with Nov. 30th.

Details of the company's business for the year ending Dec 31, 1876, are as follows:—

From Wyoming Region.....	1,080,569 tons.
“ Hazleton Region	1,707,091 tons.
“ Upper Lehigh Region	2,371 tons.
“ Beaver Meadow Region	623,562 tons.
“ Mauch Chunk Region.....	22,256 tons.
“ Mahanoy Region.....	516,931 tons.

Total in tons of 2240 lbs 3,952,780 tons.

LEHIGH COAL AND NAVIGATION COMPANY.

Table showing the coal production and shipments of the company.

Year.	Tons.	Year.	Tons.
1820.....	365	1847	351,645
1821.....	1,073	1848	360,619
1822.....	2,440	1849	393,807
1823	5,823	1850	424,258
1824.....	9,541	1851	480,824
1825.....	28,393	1852	510,406
1826.....	31,280	1853	496,905
1827.....	27,770	1854	544,811
1828.....	33,150	1855.....	449,812
1829.....	25,110	1856.....	400,425
1830.....	43,000	1857.....	400,751
1831.....	44,500	1858.....	425,896
1832.....	77,292	1859	546,816
1833.....	124,508	1860	517,157
1834	106,500	1861	410,877
1835.....	131,250	1862	241,837
1836.....	146,738	1863	517,259

Year.	Tons.	Year.	Tons.
1837	200,000	1864	517,180
1838	164,693	1865	517,025
1839	142,507	1866	400,000
1840	102,264	1867	370,204
1841	78,164	1868	453,821
1842	163,762	1869	563,914
1843	138,806	1870	468,272
1844	219,245	1871	762,682
1845	257,740	1872	1,014,890
1846	284,813	1873	1,081,153

The business of this company for 1874, is merged into that of the Lehigh and Wilkesbarre Coal Co., which is its successor.

THE WILKESBARRE COAL AND IRON Co., began mining in 1869; merged into LEHIGH AND WILKESBARRE COAL Co., in 1874. The business is shown below:

Years.	Tons.	Years.	Tons.
1869	502,485	1873	1,278,307
1870	799,226	1874	2,479,382
1871	950,754	1875	2,085,038
1872	1,168,716	1876	2,381,572

The tonnage for 1876 was produced.

At Wilkesbarre mines	1,286,672 tons.
At Summit Hill mines	606,767 tons.
At Honey Brook mines	488,132 tons.

PHILADELPHIA AND READING R. R. CO.

We give the following table showing the business of the Philadelphia and Reading Railroad Co.,—tons of coal carried, gross receipts from coal transported, and the number of miles of main line open for business, in the various years from 1850 to 1877.

Date.	Tons.	Dollars.	Miles.
1850	1,351,502	2,071,731	95
1851	1,650,270	2,018,871	95
1852	1,650,912	2,150,677	98
1853	1,582,248	2,254,694	98
1854	1,987,854	3,253,823	98
1855	2,213,292	3,664,095	98
1856	2,088,003	3,242,458	98
1857	1,709,692	2,412,923	98
1858	1,542,646	1,865,693	152
1859	1,632,932	1,883,685	152
1860	1,946,195	2,328,158	152
1861	1,639,535	2,111,023	152
1862	2,310,990	2,879,120	152
1863	3,065,261	4,897,200	152

Date.	Tons.	Dollars.	Miles.
1864.....	3,065,577	7,203,775	152
1865.....	3,090,814	8,627,292	152
1866.....	3,714,684	8,245,697	152
1867.....	3,446,826	6,404,878	152
1868.....	4,574,874	6,252,224	152
1869.....	4,239,457	8,346,240	152
1870.....	4,633,504	6,498,871	152
1871.....	6,002,573	8,287,293	260
1872.....	6,185,434	7,513,115	323
1873.....	6,546,553	9,104,094	327
1874.....	6,348,812	8,920,914	327
1875.....	5,505,455	7,636,699	327
1876.....	5,595,207	6,708,682	327

[The year ends with November 30, in all cases.]

Coal produced from the lands owned by the company during 1873-76, divided into that produced by the Philadelphia and Reading Coal and Iron Co., and that produced from lands of the company, leased to individual operators.

Year.	Leases produced.	P. & R. C. & I. Co. produced.	Average cost at mines.
1873.....	2,055,565 tons.	1,348,838 tons.	\$2.51 per ton.
1874.....	1,802,370 tons.	1,374,790 tons.	2.45 per ton.
1875.....	1,594,741 tons.	1,510,572 tons.	1.87 per ton.
1876.....	1,218,533 tons.	1,853,364 tons.	1.35 per ton.

The ton used is that of 2240 lbs.—The figures for 1876 are for eleven months of that year, to Nov. 30th, as per the company's statement.

Details of the company's business for their fiscal year, ending November 30th, 1876 :

	Paying Freight.	For Company's Use.
Received at Port Carbon.....	1,357,553 17 tons.	123,624 08 tons.
Received at Mount Carbon.....	101,410 06 tons.	9,835 11 tons.
Received at Schuylkill Haven.....	1,253,266 12 tons.	126,339 13 tons.
Received at Pine Grove.....	358,102 19 tons.	6,339 11 tons.
Received at Tamaqua.....	528,920 04 tons.	45,771 04 tons.
Wyoming and Lehigh coal.....	539,930 19 tons.	.....
Bituminous coal.....	164,306 00 tons.	7,514 16 tons.
Carried by Canal.....	653,379 13 tons.	.....
Shipped Westward.....	203,670 00 tons.	18,719 04 tons.
Consumed on Laterals.....	96,521 17 tons.	.....

Total tonnage for the year..... 5,257,062 07 tons. 338,144 07 tons.

The coal forwarded to market during the fourteen years last past was distributed as follows :

Years.	Line.	Philadelphia.	Port Richmond.
1863.....	548,755 tons.	388,352 tons.	2,128,154 tons.
1864.....	634,074 tons.	373,070 tons,	2,058,423 tons.

Years.	Line.	Philadelphia.	Port Richmond.
1865.....	659,376 tons.	380,283 tons.	2,051,202 tons.
1866.....	836,598 tons.	475,189 tons.	2,402,897 tons.
1867.....	935,694 tons.	386,933 tons.	2,121,189 tons.
1868.....	597,903 tons.	697,277 tons.	2,113,581 tons.
1869.....	923,504 tons.	888,633 tons.	2,362,972 tons.
1870.....	1,074,400 tons.	785,535 tons.	1,893,055 tons.
1871.....	1,128,227 tons.	923,539 tons.	2,311,393 tons.
1872.....	1,357,208 tons.	998,212 tons.	2,223,137 tons.
1873.....	1,670,183 tons.	1,075,255 tons.	2,266,892 tons.
1874.....	1,715,052 tons.	1,064,304 tons.	2,076,259 tons.
1875.....	1,197,449 tons.	923,850 tons.	1,713,978 tons.
1876.....	1,444,780 tons.	914,881 tons.	1,770,523 tons.

DELAWARE AND HUDSON CANAL CO.

This company began mining and carrying coal in 1829—The following table shows the tonnage since the commencement :

Years.	Tons.	Years.	Tons.
1829.....	7,000	1871.....	1,366,471
1830 to 1839.....	846,330	1872.....	2,930,761
1840 to 1849.....	2,897,881	1873.....	2,752,595
1850 to 1859.....	4,838,855	1874.....	2,399,417
1860 to 1869.....	10,098,661	1875.....	3,053,817
1870.....	2,039,722	1876.....	1,997,545

Tons are stated at 2240 lbs.

LEHIGH AND SUSQUEHANNA RAILROAD

Now operated by the

CENTRAL RAILROAD OF NEW JERSEY.

Amount of coal carried over the Lehigh and Susquehanna Railroad since its opening :

Year 1868.....	1,058,054 tons.
Year 1869.....	1,297,825 tons.
Year 1870.....	1,354,052 tons.
Year 1871.....	1,033,587 tons.
Year 1872.....	2,527,068 tons.
Year 1873.....	3,089,697 tons.
Year 1874.....	2,972,286 tons.
Year 1875.....	2,661,635 tons.
Year 1876.....	2,952,520 tons.

[Tons of 2240 lbs.]

A schedule of prices offers, at times, a fair reflex of the condition of business, and this exceptional remark must be kept in view, to make the following table of value.

We have selected the prices of the Lehigh Coal Exchange for their coal, f. o. b. at shipping points; and the Wilkesbarre Coal of the Lehigh and Wilkesbarre Coal Co., f. o. b., as indicative of the market values. We also give the rates obtained at the auction sale of the 29th of August.

Prices of Anthracite during 1876.

	Lump.	Grate.	Egg.	Stove.	Chestnut.		
January — Lehigh.....	\$5 55	\$5 55	\$5 65	\$6 10	\$5 10		
Wilkesbarre.....	5 05	5 25	5 65	6 00	4 95		
February—Lehigh.....	5 25	4 90	5 00	5 50	4 85		
Wilkesbarre.....	4 65	4 75	4 95	5 50	4 70		
March — Lehigh.....	4 90	4 70	4 70	5 30	4 60		
Wilkesbarre.....	4 60	4 80	4 90	5 50	4 70		
April — Lehigh.....	4 90	4 70	4 70	5 30	4 60		
Wilkesbarre.....	4 60	4 80	4 90	5 50	4 70		
May — Lehigh.....	4 95	4 75	4 75	5 35	4 65		
Wilkesbarre.....	4 65	4 85	4 95	5 55	4 75		
June—Lehigh.....	5 00	4 80	4 80	5 40	4 70		
Wilkesbarre.....	4 70	4 90	5 00	5 60	4 80		
July — Lehigh.....	5 05	4 85	4 85	5 45	4 75		
Wilkesbarre.....	4 75	4 95	5 05	5 65	4 95		
August—Lehigh.....	5 20	5 00	5 00	5 60	4 90		
Wilkesbarre.....	4 90	5 10	5 20	5 80	5 00		
Auction Prices	{ Pennsylvania Coal Co.....	2 72½	2 68½	2 87½	3 68¾	3 26¼	
		Delaware and Hudson Co..	2 76½	3 35	3 18½	3 85
		Del. Lack. & West'n R. R.	2 77½	2 72½	2 78	3 60½	2 77½
		Philadelphia and Reading.	2 11½	2 66½	2 20½	2 71½	1 98½
September—Lehigh.....	4 00	3 50	3 60	4 00	3 30		
Wilkesbarre.....	3 25	3 50	3 50	4 00	3 30		
October — Lehigh.....	4 00	3 60	3 60	4 00	3 30		
Wilkesbarre.....	3 25	3 50	3 50	4 25	3 50		
November—Lehigh.....	4 00	3 60	3 60	4 00	3 60		
Wilkesbarre.....	3 25	3 50	3 50	4 25	3 60		
December —Lehigh.....	3 75	3 25	3 25	3 75	3 50		
Wilkesbarre.....	3 00	3 00	3 00	3 75	3 25		

We give below prices for Schuylkill White Ash Lump Coal, on board vessels at Philadelphia, from 1834 to 1875. inclusive ; prepared originally by W. G. Neilson, and continued by I. W. Morris, Jr.—being the average rates obtained from sales made during the year :

Years.	Prices.	Years.	Prices.
1834.....	\$4 84	1845.....	\$3 46
1835.....	4 84	1846.....	3 90
1836.....	6 64	1847.....	3 80
1837.....	6 72	1848.....	3 50
1838.....	5 27	1849.....	3 62
1839.....	5 00	1850.....	3 64
1840.....	4 91	1851.....	3 34
1841.....	5 79	1852.....	3 46
1842.....	4 18	1853.....	3 70
1843.....	3 27	1854.....	5 19
1844.....	*3 20	1855.....	4 49

*Lowest point.

1856.....	\$4 11	1866.....	\$5 80
1857.....	3 87	1867.....	4 37
1858.....	3 43	1868.....	3 86
1859.....	3 25	1869.....	5 31
1860.....	3 40	1870.....	4 39
1861.....	3 39	1871.....	4 46
1862.....	4 14	1872.....	3 74
1863.....	6 06	1873.....	4 27
1864.....	†8 39	1874.....	4 55
1865.....	7 86	1875.....	4 39

† Highest point.

DELAWARE, LACKAWANNA & WESTERN R. R. CO.

The coal business of this Company, which began in 1854, has been as below:—

Year.	Tons.	Year.	Tons.
1854.....	133,965	1866.....	1,519,538
1855.....	187,000	1867.....	1,719,321
1856.....	305,530	1868.....	1,728,785
1857.....	490,023	1869.....	1,563,928
1858.....	683,411	1870.....	2,348,097
1859.....	829,435	1871.....	1,916,486
1860.....	1,080,227	1872.....	2,836,948
1861.....	1,104,319	1873.....	3,136,306
1862.....	1,094,315	1874.....	2,570,437
1863.....	1,223,165	1875.....	3,326,901
1864.....	1,302,457	1876.....	2,300,500
1865.....	1,007,074		

Tons are stated at 2000 lbs. per ton.

PENNSYLVANIA COAL CO.

The tonnage produced, by this Company since 1850, has been as below:—

Year.	Tons.	Year.	Tons.
1850.....	111,014	1864.....	759,544
1851.....	316,017	1865.....	577,494
1852.....	426,164	1866.....	535,385
1853.....	512,659	1867.....	861,730
1854.....	496,648	1868.....	953,855
1855.....	504,803	1869.....	966,637
1856.....	612,500	1870.....	1,086,008
1857.....	536,008	1871.....	802,039
1858.....	630,056	1872.....	1,213,478
1859.....	688,854	1873.....	1,239,214
1860.....	701,523	1874.....	1,338,663
1861.....	629,657	1875.....	1,368,207
1862.....	601,091	1876.....	1,086,475
1863.....	662,904		

Tons are stated at 2240 lbs.

As an indication of the rise and fall of prices, prior to, during, and after the collapse of the combination, we append the following prices, being those of Lehigh and Wilkesbarre Coal Co., for their "Wilkesbarre" coal; prepared expressly for this work.

1872.											
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov. Dec.
Lump.....	4 00	3 75	3 75	3 75	3 75	3 75	3 75	3 75	3 60	4 00	4 00
Broken.....	4 40	3 85	3 85	3 85	3 85	3 85	3 85	3 85	3 85	4 35	4 40
Egg.....	4 50	3 85	3 85	3 85	3 85	3 85	3 85	3 85	3 85	4 35	4 50
Stove.....	5 25	4 25	4 25	4 35	4 35	4 25	4 25	4 25	4 10	4 60	5 00
Chestnut.....	4 25	3 75	3 75	3 80	3 80	3 80	3 80	3 80	3 60	4 10	4 00
1873.											
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov. Dec.
Lump.....	4 25	4 45	4 45	4 45	4 55	4 65	4 75	4 85	4 95	5 05	5 05
Broken.....	4 45	4 65	4 65	4 65	4 75	4 85	4 95	5 05	5 15	5 25	5 25
Egg.....	4 70	4 90	4 90	4 80	4 90	5 00	5 10	5 20	5 30	5 40	5 40
Stove.....	5 15	5 35	5 35	5 00	5 10	5 20	5 30	5 40	5 50	5 60	5 70
Chestnut.....	4 35	4 45	4 45	4 45	4 55	4 65	4 75	4 85	4 95	5 05	5 05
1874.											
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov. Dec.
Lump.....	5 05	5 05	4 55	4 60	4 70	4 80	4 95	5 10	5 25	5 40	5 55
Broken.....	5 25	5 25	4 75	4 80	4 90	5 00	5 15	5 30	5 45	5 60	5 75
Egg.....	5 40	5 40	4 90	4 95	5 05	5 15	5 30	5 45	5 60	5 75	5 90
Stove.....	5 70	5 70	5 35	5 40	5 50	5 65	5 80	5 95	6 10	6 25	6 40
Chestnut.....	5 05	5 05	4 35	4 40	4 50	4 60	4 75	4 90	5 05	5 20	5 35
1875.											
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov. Dec.
Lump.....	5 55	5 55	4 40	4 60	4 80	4 90	5 00	5 00	5 05	5 05	5 05
Broken.....	5 75	5 75	4 60	4 80	5 00	5 10	5 20	5 20	5 25	5 25	5 25
Egg.....	5 90	5 90	4 75	4 95	5 15	5 25	5 35	5 45	5 55	5 65	5 65
Stove.....	6 40	6 40	5 30	5 40	5 60	5 70	5 80	5 90	6 00	6 10	6 10
Chestnut.....	5 35	5 35	4 35	4 40	4 60	4 70	4 80	4 90	4 95	4 95	4 95

PENNSYLVANIA.

NORTHERN PENNSYLVANIA SEMI-BITUMINOUS COAL FIELD.

The first coal from the Blossburg district. in this coal field, was sent to market from the "Bloss" mines in 1840. The producers are the Fall Brook Coal Company, and Blossburg Coal Company, with mines near Blossburg, Tioga county, Pa. Seventy five miles of railway, carries the coal from the mines to Seneca Lake, in New York State, where it is received into canal boats which deliver it by the canal system of water ways, throughout the State. The railway from the mines connects with the Erie Railway at Corning, N. Y., affording additional outlets to market, by the railways of the State and their connections, for the coal from this region; it being shipped as far west as Salt Lake City.

The most important seam is that known as the Bloss vein, a clean bed of pure coal, from $4\frac{1}{2}$ to $5\frac{1}{2}$ feet in thickness.

Statistics of the output are shown in the following schedule :

Year.	Tons.	Year.	Tons.
1840.....	4,235	1858.....	41,894
1841.....	25,966	1859.....	48,393
1842.....	13,164	1860.....	76,918
1843.....	6,268	1861.....	112,712
1844.....	14,234	1862.....	179,334
1845.....	29,836	1863.....	235,843
1846.....	16,509	1864.....	384,977
1847.....	29,807	1865.....	394,642
1848.....	33,763	1866.....	411,759
1849.....	32,095	1867.....	481,318
1850.....	23,161	1868.....	602,328
1851.....	25,000	1869.....	715,094
1852.....	20,000	1870.....	733,035
1853.....	45,507	1871.....	815,079
1854.....	70,214	1872.....	849,262
1855.....	73,204	1873.....	991,057
1856.....	70,669	1874.....	796,388
1857.....	94,314	1875.....	581,782
1876.....		1876.....	616,984

The Barclay district is located in Bradford county, Pa., some 36 miles south from Waverly, N. Y. The mines are owned by the Fall Creek Bituminous Coal Co., the Erie Railway Co., (comprising the lands formerly of the Barclay) the Towanda Coal Co., and the Schrader Coal Co.

The table which we give on the next page shows the amount of coal shipped from the Barclay Coal Region, by the several companies which have operated it.

Year.	Barclay Coal Co.	Towanda Coal Co.	Fall Creek Coal Co.	Total Products.
1856.....	2,295	—	—	2,295
1857.....	6,265	—	—	6,265
1858.....	17,560	—	—	17,560
1859.....	30,143	—	—	30,143
1860.....	27,718	—	—	27,718
1861.....	40,835	—	—	40,835
1862.....	52,779	—	—	52,779
1863.....	54,535	—	—	54,535
1864.....	62,058	—	—	62,058
1865.....	48,375	7,886	16,936	73,197
1866.....	37,968	31,881	29,604	99,453
1867.....	30,119	27,668	16,953	74,739
1868.....	—	67,080	6,595	73,675
1869.....	—	176,307	4,303	180,610
1870.....	—	196,310	77,025	273,335
1871.....	—	249,240	129,095	378,335
1872.....	Schrader	263,960	118,882	382,842
1873.....	Coal Co.	252,329	85,315	337,644
1874.....	100,219	215,572	21,281	337,072
1875.....	157,686	200,424	18,507	376,637
1876.....	200,795	160,343	—	361,138

The Towanda for 1876 is for the fiscal year ending November 30.

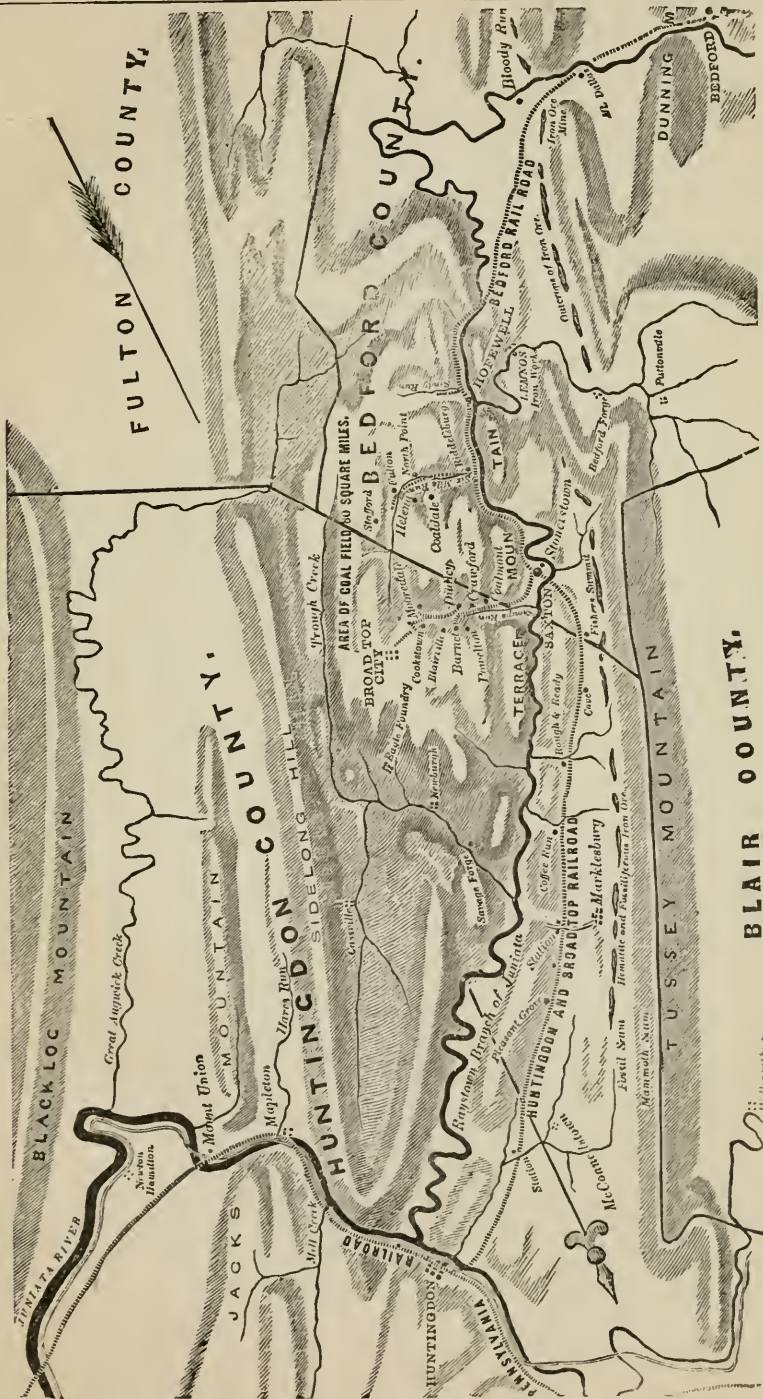
The McIntyre Coal Co., whose mines are at Ralston, Pa., on the Northern Central Railway (54 miles south from Elmira, N. Y.,) which gives them an outlet both north and south to a market, commenced operations in 1870. Statistics of their business are as below :

Year.	Tons.	Year.	Tons.
1870.....	17,802	1874.....	138,907
1871.....	106,138	1875.....	164,507
1872.....	171,420	1876.....	208,701
1873.....	21,462		

Since the opening of the mines of the Blossburg district, in 1840, the shipments by each company have been as follows :

Arbon Coal Company, 1840-1843.....	49,633 net tons.
Wm. M. Mallory, 1844-1857.....	405,113 net tons.
D. S. Magee, 1856-59.....	78,996 net tons.
Tioga Transportation Company.....	323,174 net tons.
Salt Company of Onondaga, 1863-1866.....	267,809 net tons.
Morris Run Coal Company, 1864-1876.....	3,538,385 net tons.
Fall Brook Coal Company, 1860-1876.....	3,164,105 net tons.
Blossburg Coal Company, 1866-1876.....	1,806,283 net tons.

Total production of the district..... 9,683,501 net tons.



MAP OF THE BROAD TOP COAL AND IRON REGION.

BROAD TOP SEMI-BITUMINOUS COAL FIELD.

The area of this coal field is stated at eighty square miles, and the aggregate thickness of workable coal seams is 26 feet, the larger seams range from five to ten feet in thickness, and the lesser from one to three.

An outlet for the coal from this region is afforded by the Huntingdon and Broad Top Mountain Railroad (this was completed in 1856, and during the latter part of that year 42,000 tons were forwarded from this region to various markets.) This line extends from the town of Huntingdon, on the Pennsylvania Railroad, 203 miles west of Philadelphia, to Mt. Dallas in Bedford county, a distance of 45 miles. At Saxton, 24 miles from Huntingdon, a branch road, 10 miles in length, extends to Broad Top City; at Riddlesburg, 5 miles beyond Saxton, is another branch in to Fulton, 5 miles from the main road.

From Mt. Dallas the Bedford and Bridgeport Railroad, 38⁶⁻¹⁰ miles in length, extends to the Maryland State line; from this point to Cumberland, Md., via the Cumberland and Piedmont Railroad, is 7 miles. This connection gives an outlet to the Cumberland coal to the interior markets of Pennsylvania, to Philadelphia and South Amboy, N. J. The Bedford and Bridgeport road is leased to the Pennsylvania Railroad and operated by them.

The yearly shipments from this region, by the H. & B. T. R. R., have been as follows :

Year.	Tons.	Year.	Tons.
1856.....	42,000	1866.....	265,720
1857.....	78,813	1867.....	244,412
1858.....	105,478	1868.....	280,936
1859.....	130,595	1869.....	360,778
1860.....	186,903	1870.....	313,425
1861.....	272,625	1871.....	319,625
1862.....	333,606	1872.....	297,173
1863.....	305,678	1873.....	350,245
1864.....	386,645	1874.....	226,693
1865.....	315,906	1875.....	204,921
1876.....	159,779		

The East Broad Top Railroad penetrated this coal field in 1875, and carried 53,567 tons of coal during that year, and 66,104 in 1876.

The shipments of Cumberland coal over the Pennsylvania State line, and H. & B. T. R. R. have been as below :

Year.	Tons.	Year.	Tons.
1872.....	22,021	1874.....	67,671
1873.....	114,589	1875.....	175,154
1876.....	145,796		

SNOW SHOE SEMI-BITUMINOUS COAL FIELD.

This region is located in Centre county, Pennsylvania. It covers an area of about eight miles in length, and some four miles in breadth, and is situated on both sides of Beach Creek. The coal finds an outlet to market, via the Bellefonte and Snowshoe, and Bald Eagle Valley connections of the Pennsylvania Railroad; it being 47 miles from Snowshoe to Tyrone, on the main line.

There is but one company mining in this district. It commenced operations in the year 1862, with 8,260 tons, and has increased as below :

Year.	Tons.	Year.	Tons.
1862	8,260	1869.....	89,356
1863.....	12,039	1870.....	85,276
1864.....	33,593	1871.....	79,984
1865.....	51,881	1872.....	68,988
1866.....	70,890	1873.....	95,257
1867.....	58,137	1874.....	63,540
1868.....	60,149	1875.....	62,426
1876.....	51,399		

Prof Rogers gives this Snowshoe coal 78.8 of Fixed Carbon, and 21.2 of Volatile Matter and Ashes.

CLEARFIELD REGION.

This coal field is located in Clearfield and Centre counties, in the central portion of the State of Pennsylvania; for an outlet for the products of its mines it is dependent upon the Tyrone and Clearfield branch of the Pennsylvania Railroad, extending from Tyrone on the main line, (224 miles west from Philadelphia,) to Clearfield, 41 miles. The Pennsylvania Railroad Company own the railroads, the shipping wharves, and all the means of access to the markets of the Atlantic seaboard; the advantage of being connected with a railroad of such magnitude, with its wonderful ramifications and connections, gives the coal proprietors of this region great facilities for the proper conduct of their business, and it is owing to the very liberal policy of this corporation, that the district has been enabled to take the rank which it has assumed, in connection with the fuel supply of the seaboard. The figures given of the production, show that the market for this quality of coal has steadily increased while other districts fell off; its introduction at New York and the East, has been most successful during the year last past.

The coal is used for steam purposes under stationary, marine, or locomotive engines, for making iron and steel rails, for glass works, in lime kilns, and for many other purposes, being much liked wherever used; ignites freely, burns readily, and leaves a white ash. It is not easily friable, and bears transportation remarkably well.

The first actual business in quantity from this coal field was in 1862, the returns have not been carefully kept for the first few years. but from that date until the year 1870, the business is returned to us by the Pennsylvania company at some 696,377 tons forwarded over its line to market.

The coal measures are found to be admirably adapted for working, dipping gently toward the Moshannon Creek, which flows through the centre of the basin. The lowest seam of coal (A), five feet thick, crops out on the level of this stream. The next (B), sixty feet above, is three to four feet in thickness. Fifty feet above is another seam (C), ranging from two to three and a half feet in thickness. Again, fifty feet above, is found a seam (D) of five feet of good solid coal.

Analyses of coal from this district made by the State Geological Survey of 1875, gave :

NAME OF COLLIERY	Water.	Volatile matter.	Fixed carbon.	Sulphur.	Asb.
<i>Clearfield County.</i>					
1. Penn Colliery.....	.810	20.640	74.023	.507	4.020
2. Franklin Colliery.....	.670	21.360	74.284	.435	3.251
3. Eureka Mine.....	.780	21.680	73.052	.688	3.800
4. Stirling Mine.....	.710	23.400	72.218	.632	3.140
5. Moshannon Colliery.....	.765	20.090	74.779	.666	3.700
6. New Moshannon Mine.....	1.100	23.070	71.199	.611	4.020
7. Hale's Colliery. Upper bed.....	.570	24.630	68.400	1.900	4.500
8. Hale's Colliery. Lower bed.....	.740	25.210	68.628	2.122	3.800
9. Mapleton Colliery.....	.700	23.565	68.890	1.715	6.130
10. Logan Colliery.....	.620	22.135	68.728	.567	7.650
11. Laurel Run Colliery.....	.800	23.260	72.350	.590	3.000
12. Decatur Coal Co.'s Colliery. Lower bench.....	.640	24.360	64.082	3.878	7.540
13. Decatur Coal Co.'s Colliery. Upper bench.....	.820	23.900	69.007	1.373	4.900
14. Morrisdale Mine. Lower bench.....	.550	24.090	71.689	.571	3.100
15. Morrisdale Mine. Upper bench.....	.560	25.190	71.013	.587	2.650
16. Derby Colliery.....	.410	22.810	66.690	1.790	8.800
17. Reitur's Colliery. Upper bed.....	.630	24.630	70.396	.654	3.690
18. Mon's Mine.....	.750	19.570	69.833	.677	9.170
19. Hill's Mine.....	.880	22.280	67.995	2.455	6.690
20. Humphrey's Mine.....	.410	21.800	72.903	1.087	3.800
21. Mason's Mine. Upper bench.....	.650	22.650	72.616	1.384	2.856
22. Mason's Mine. Lower bench.....	.480	22.320	69.788	4.232	13.150
23. G. W. Davis' Mine.....	.640	23.010	71.799	.651	4.000
24. Jeremiah Cooper's Mine.....	.700	24.020	64.951	1.639	8.690
25. Williamson's Mine.....	.620	22.730	68.784	1.576	6.280
26. Powelton Mine. Lower part of bed.....	.600	22.600	68.709	2.691	5.400
27. Powelton Mine. Upper part of bed.....	.540	22.560	71.551	1.079	4.270
28. Webster's Colliery.....	1.630	22.000	72.815	.425	3.130
29. Bell's Mine.....	.950	32.450	59.904	1.296	5.400
30. Tyler's Mine.....	.940	31.060	61.563	1.487	4.950
31. R. Shaw's Mine.....	.870	21.680	68.928	1.202	7.220
32. J. Shaw's Mine.....	.520	21.080	67.133	.767	10.550
33. Mongold's Mine.....	.860	31.600	61.662	2.228	3.590
34. Hubler's Mine.....	.420	25.010	67.221	2.479	4.870
35. Beaver Run.....	.920	21.550	74.009	.631	2.890
<i>Centre County.</i>					
1. Snow Shoe Mines. Upper bed. Mine No. 5.....	1.250	25.580	68.937	.613	3.590
2. Snow Shoe Mines. Middle bed. Mine No. 6.....	.650	24.560	70.416	.964	3.410
3. Snow Shoe Mines. Lower bed (B). Mine No. 4.....	.750	23.440	64.374	.956	10.450
4. Wm. Holt's Mine, west of Holt's Hill.....	.880	23.620	70.089	.661	4.750
5. Wm. Holt's Mine, Snow Shoe basin. Upper bed.....	1.680	21.570	71.108	.612	4.730

The rate of wages paid in this coal field have been during 1876, only some forty or forty-five cents per ton for the digging of the coal; this is lower than in competing regions, and is one of the causes, in connection with the favorable arrangements made with the carrying company, that has enabled the region to hold its own in the matter of product.

We give below statistics of the product from the beginning :

In the years 1862--1870.....	696,377 tons.
In the year 1870.....	410,523 tons.
In the year 1871.....	542,896 tons.
In the year 1872.....	431,915 tons.
In the year 1873.....	592,860 tons.
In the year 1874.....	639,630 tons.
In the year 1875.....	928,297 tons.
In the year 1876.....	1,281,861 tons.

Making a total of (in tons of 2,000 lbs.).....5,534,359 tons.

MYER'S MILLS OR SALISBURY REGION.

This district is located in Somerset county, Pennsylvania, adjoining the Cumberland region of Maryland, and the coal is stated to be similar to, and an extension of the Cumberland coal basin. The coal is of the same quality and will yield an equal quantity per acre. It is eleven miles from Frostburg. Md., and the coal finds an outlet to Baltimore and the seaboard markets over the Pittsburgh and Connellsville branch of the B. & O. R. R. The Keystone Coal Co., have been at work here since 1872, and have already built up a business ranging from 250 to 600 tons per day, according to the season; the property of the company is advantageously situated for the shipment of its production, and the rate of transportation from the mines to market is very favorable. The Cumberland and Elk Lick Coal Co. own 1,500 acres of land in this district, and have been doing a good business, having sent to market in the year last past some 39,919 tons.

Myers mills, which may be stated as the centre of the district, is 217 miles from Baltimore, and 112 miles from Pittsburgh, by present routes.

The first coal seam rests on a thin floor of fire clay. The coal bed has two benches; the lower, 18 inches thick, is an impure cannel coal circling to block structure; the upper is a medium quality of semi-bituminous coal with the well marked columnar structure peculiar to Allegheny coals.

The interval between this and the next small coal seam is composed of thin plates of sandstones with olive-colored shales.

The second workable seam (B) is pre eminently *the bed* of the lower system of coal measures; not perhaps, so much from its size and good quality of coal, as from its ready and sure identification, wherever it exists, by the massive bed of limestone on which it rests. The farmers trace it from hill-side to hillside, regarding it with peculiar affection as a *double gift*—not only supplying fuel for domestic use, but also with lime to enrich the “glades” in their mountain farms.

The coal in this bed is columnar in structure with plates of mineral charcoal disseminated. In structure and quality it is closely associated with

the best Clearfield coal. It will be found a superior fuel for iron working.

The third seam (C) is all pure coal of an excellent quality; but as the bed is high in the measures and does not occupy a wide area in this portion of the field, it has as yet received little attention.

From seam B to the top of the scale, the measures are composed of very soft flesh and olive colored shales, which have been rounded and softened into easy rolling slopes and rounded hills.

WESTMORELAND REGION.

The celebrated Penn and Westmoreland Gas Coal is mined near Penn and Irwin stations, on the Pennsylvania Railroad, in Westmoreland county; the distance from Philadelphia is 332 miles. The coal mined is the great Pittsburgh bed of Bituminous coal; the companies operating in this region are large and influential, among them being the Penn Gas Coal Co., and the Westmoreland Gas Coal Co.; the region does a business of about a million tons annually; the coal is used in every seaboard city for gas purposes, and always commands the highest price, in fact it makes the rate for all other gas producing coal that reaches the seaboard. The shipping points are South Amboy, N. J., and Greenwich, on the Delaware river, below Philadelphia. The shipments from this region for 1874 were 952,971 tons, for 1875, 769,968 tons, for 1876, 902,139 tons coal and 60,094 tons coke.

This coal is in great favor among gas engineers in the United States.

In the dry way, by the ordinary process, the Westmoreland coal yields on an average sample as follows:

Charge, 224 pounds, carbonized 3 h. 20 m., produced per ton.....	9,500 cubic ft.
Illuminating power, standard Argand.....	16.52 candles.
Weight of coke, per ton.....	1,544 pounds.
Bushels of coke, per ton.....	40
Maximum yield of gas per ton.....	10 642 cubic ft.
One bushel of lime purified.....	6,420 cubic ft.

Analysis of the coal:

Volatile matter.....	.36 per cent.
Fixed carbon.....	.58 per cent.
Ash.....	6 per cent.

100

Value of the gas from one ton estimated in pounds of spermacetti.....541.26 pounds.

The above results were obtained in the experimental works of the Manhattan Gas Light Company, New York, where the daily average yield of gas from this coal and its equivalent, the "Penn," is about 10,000 cubic feet of seventeen candle gas.

SONMAN REGION.

This coal district lies in Cambria county, the coal is worked in the same

vein that is mined in Clearfield county; the coal here has a heavier cover than where found in the adjoining county of Clearfield; is strong, and partakes somewhat of the nature of the gas coal found in Westmoreland county, which adjoins it on the south-west; the trade has largely increased during the past three years, shipments having been made to all tide-water ports, to New England, Baltimore, Chicago, Cleveland, etc., at the west, and along the line of the Pennsylvania Railroad; it has not only maintained its place, but gained in favor. Messrs. Dysart & Co., are the owners and proprietors of the coal lands in this district, and the business has been developed to large proportions through their enterprise.

An analysis made of Sonman Vein White Ash Coal by Dr. C. M. Cresson, gave the following results, as compared with Broad Top and Westmoreland:

	Sonman.	Broad Top.	Westmoreland.
Volatile matter.....	18.30	17.85	32.85
Fixed Carbon.....	78.60	74.65	61.45
Ash.....	2.70	7.50	5.80
Sulphur.....	0.40	1.85	1.04

The ash consists of Alumina, Silica and Lime. Does not produce clinker. The yield of coke showed 82.30 per cent.; taking the "Penn" coal at 1000 as the standard for steam purposes, Sonman coal is equivalent to 959.

MERCER COUNTY, PENNSYLVANIA.

The most important coal region in North-west Pennsylvania (running over into Eastern Ohio), is that of Mercer county. The coal produced is what is known as the splint or block coal, and is used in the raw state for smelting iron; the principal location of this peculiar coal is on the Erie and Pittsburgh Railroad, about 75 miles south from Erie, Pa. The product finds an outlet to market by this route, and the Beaver and Erie canal. The beds vary from two to five feet in thickness, and some six hundred thousand tons are annually produced, the figures for 1873 aggregating 529,496 net tons.

WEST BRANCH REGION.

The Philadelphia and Erie Railroad runs across the northern ends of five coal basins. There is no important development of the first two. In the third, at 67 miles west of Williamsport, is the Wistar Mountain Co's mines; at 97 miles, are the works of the Cameron Coal Co. In the fourth, at 117 miles, is St. Mary's; at 125 miles, Benzinger's; at 128 miles, the Shawmut branch road comes in. In the fifth, at 138 miles, are the Johnsonburg mines. The completion of the Buffalo, New York, and Philadelphia.

Railroad gives the coal from these basins an outlet to an additional market; and during 1875, some 63,348 tons coal were carried by this road. The Philadelphia and Erie road carried in 1873, 81,742 net tons, 162,000 tons in 1874, and in 1875, 166,978 tons.

McKEAN COUNTY, PENNSYLVANIA.

In the southern part of McKean County, in what is known as the fifth coal basin is an important coal district, located near the Buffalo and Rochester markets; the district is entitled to our attention and notice.

No other coal basin contains so large a body of coal, at its northern extremity as this, owing probably to its being situated on the dividing waters, where the work of denudation has been less destructive. The McKean and Buffalo railroad which extends from Larrabees, on the Buffalo, New York and Philadelphia Railroad, to Smethport, a distance of $22\frac{1}{2}$ miles, gives an outlet for the coal from this district, the distance being but 108 miles to Buffalo, and 150 to Rochester.

Analyses and practical tests of considerable quantities of this coal, under stationary and locomotive boilers, indicate that it is a good quality of bituminous coal, with excellent steam-generating qualities. A company, known as "The Buffalo Coal Company," is developing this region. During 1875, while at work only six months, the business was 131,190 tons. We give the following analyses of three samples, from the Pennsylvania Geological survey report of 1875.

Water	1,130	1,300	1,170
Volatile matter	33,090	39,830	35,440
Fixed Carbon	53,006	52,063	43,992
Sulphur	1,874	1,727	1,708
Ash	10,900	5,080	17,690

MONONGAHELA REGION.

This district may truly be called the perfection of a coal region. The Monongahela river for 95 miles, possesses every advantage for facilitating the production of coal, and it is not surprising that the tonnage is so immense. The seam worked is of uniform thickness, and yields a pure coal, used for iron making, steam raising, and for gas and domestic purposes.

By means of its slack-water navigation, the Monongahela river is made navigable at all seasons of the year, and boats carrying eight hundred tons are passed down. The city of Pittsburgh is supplied mainly by railroad, and the larger portion of the coal going down by river, is run down the Ohio and Mississippi to the lower markets. The boats in use are known as "broad horns" carrying 20,000 bushels, "barges" carrying 11,000 bushels, and "flats" carrying 2,000 bushels. The following statement of shipments

by the slack-water navigation, from 1845 to date, is of interest :

Year.	Tons.	Year.	Tons.
1845.....	184,200	1860.....	1,517,909
1846.....	311,156	1861.....	834,630
1847.....	385,805	1862.....	743,358
1848.....	392,774	1863.....	1,134,150
1849.....	398,340	1864.....	1,402,828
1850.....	491,918	1865.....	1,580,791
1851.....	490,850	1866.....	1,704,212
1852.....	585,233	1867.....	1,202,908
1853.....	628,654	1868.....	1,812,040
1854.....	693,278	1869.....	2,100,504
1855.....	889,360	1870.....	2,303,856
1856.....	353,364	1871.....	1,944,852
1857.....	1,158,939	1872.....	2,291,220
1858.....	1,027,866	1873.....	2,094,312
1859.....	1,131,467	1874.....	2,503,504
		1875.....	2,275,265
		1876.....	2,495,800

The business done by the various railroads entering or passing through this coal field, is indicated by the fact that in 1876 the Pennsylvania Railroad carried upwards of 1,300,000 tons from this district; the reader is referred to the details of the business done at the city of Pittsburgh, for figures of other railroads to which this region is tributary. In this connection, the cost of transporting coal over water ways, as—for instance—from Pittsburgh to New Orleans, is of value. The distance is something like 2000 miles, the rate is about $3\frac{3}{4}$ cents per bushel, or \$1 05 per ton of 2240 lbs.; the ordinary time being about two weeks, when all circumstances are favorable. From Pittsburgh to Louisville, Ky., the distance is six hundred miles; the cost $1\frac{3}{4}$ cents per bushel, including return of empty craft; and the time five days.

WEST VIRGINIA GAS COAL.

That class of gas coal known in the New York and Eastern markets as "West Virginia Gas Coal," is mined in Marion, Taylor, Ritchie and Preston counties, West Virginia, the mines being located near to or upon the main line of the Baltimore and Ohio Railway. The coal is used for gas in the cities of the seaboard, and is very favorably spoken of. The distances to Baltimore are as follows: From Clarksburg, 301 miles; from Fairmount, 302 miles; from Newburg, 263 miles; from Tunnelton, 260 miles; from Cairo, 355 miles.

The veins are from six to eleven feet in thickness. Analyses of these coals have given the following results :

	Volatile matter.	Fixed carbon.	Ash.
Clarksburg, Main seam	56.74	41.66	1.60
“ Cannel.....	49.21	45.43	5.36

The trade to the seaboard began in the year 1868 with 165,772 tons. The business to date has been as below:

Year.	Tons.	Year.	Tons.	Year.	Tons.	Year.	Tons.
1868.....	165,772	1870.....	249,879	1872.....	217,569	1874.....	125,000
1869.....	269,158	1871.....	189,763	1873.....	190,673	1875.....	100,000

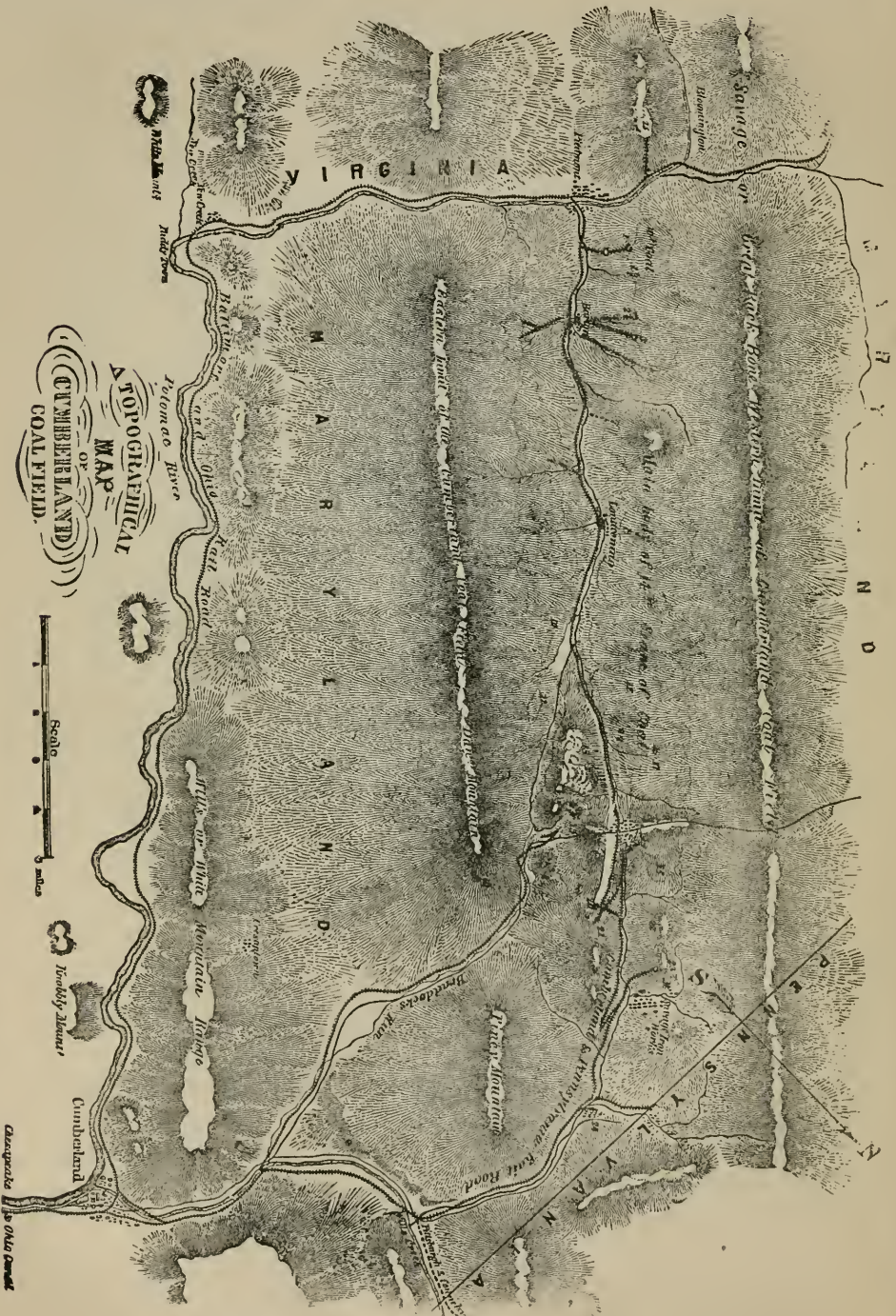
In addition to the outlet eastward via B. & O. R. R. there is the Parkersburg route due west, crossing the Monongahela river at Clarksburg, and thence to the Ohio river at Parkersburg; and the Wheeling route north-westward, crossing the Monongahela at Fairmount, thence down the creek to the Ohio, and thence up the river to Wheeling. Both these branches enter the main coal measures near the crossing of the Monongahela above named, and traverse them to the Ohio. At Clarksburg and northward, down the Valley of the Monongahela, is one of the richest coal regions of West Virginia. One of the beds in the neighborhood of this town measures from ten to twelve feet in thickness, with a thinner bed of more highly bituminous nature underlying; from some distance above Clarksburg, they may be followed with scarcely an interruption throughout the whole valley of the Monongahela northward to Pittsburgh.

THE CUMBERLAND, (MD.) REGION.

The Cumberland (George's Creek) coal field, located in Alleghany county, at the western extremity of the State of Maryland, supplies an important proportion of the Semi-Bituminous coal, reaching the seaboard markets. The connection with the tide-water markets are via the Baltimore & Ohio R. R., from the town of Cumberland, 178 miles, and Piedmont, 206 miles, west from Baltimore; via the Chesapeake and Ohio Canal, following the Potomac river to Georgetown, 184 miles, and Alexandria, 191 miles from Cumberland.

The production of the mines in this district is of superior quality; the coal worked is from seven to fourteen feet in thickness; the full extent of the vein is seldom taken out, the roof being insecure. The mines are located on the line of the Cumberland and Piedmont branch road, which extends through the region, and are distant from, say $1\frac{1}{2}$ to 20 miles from Piedmont, and from 11 to 33 miles from Cumberland.

In the year 1842 this coal field sent its product to the tide-water markets over the branches of the B. & O. R. R., connecting with this field. In 1850 the Chesapeake and Ohio Canal was finished to Cumberland, Md.



In the fall of the year 1872, there was built a line from the Pennsylvania Railroad to tap the Cumberland road, the connection being made at or near Mt. Savage.

The following tables will show the business that has been done from this region.

Forwarded by Baltimore & Ohio Railroad.

Years.	Tons.	Years.	Tons.	Years.	Tons.
1842.....	1,708	1854.....	503,836	1866.....	736,153
1843.....	10,082	1855.....	478,486	1867.....	735,669
1844.....	14,890	1856.....	502,330	1868.....	848,118
1845.....	24,653	1857.....	465,912	1869.....	1,230,518
1846.....	29,795	1858.....	395,405	1870.....	1,112,938
1847.....	52,940	1859.....	426,512	1871.....	1,494,814
1848.....	79,571	1860.....	493,031	1872.....	1,517,347
1849.....	142,449	1861.....	172,075	1873.....	1,780,710
1850.....	192,806	1862.....	218,950	1874.....	1,576,160
1851.....	174,701	1863.....	531,553	1875.....	1,302,237
1852.....	268,459	1864.....	399,354	1876.....	1,070,775
1853.....	376,219	1865.....	560,293		

Grand total by this outlet.....19,921,446 tons—of 2240 lbs.

Forwarded by Chesapeake and Ohio Canal.

Years.	Tons.	Years.	Tons.	Years.	Tons.
1850.....	4,042	1859.....	297,842	1868.....	482,325
1851.....	82,978	1860.....	295,878	1869.....	652,151
1852.....	65,719	1861.....	97,599	1870.....	604,137
1853.....	157,760	1862.....	98,684	1871.....	850,339
1854.....	155,845	1863.....	216,792	1872.....	816,103
1855.....	183,786	1864.....	258,642	1873.....	778,802
1856.....	204,120	1865.....	343,202	1874.....	767,064
1857.....	116,574	1866.....	343,178	1875.....	879,838
1858.....	254,251	1867.....	458,153	1876.....	632,440

Forwarded over Penn. State line branch.

Year.	Tons.	Year.	Tons.
1872.....	22,021	1875.....	160,698
1873.....	114,589	1876.....	131,866
1874.....	67,671		

The average price for this coal f. o. b. at Baltimore, forms an interesting feature in connection with the trade therein :

Year.	Average Price at Baltimore.	Year.	Average Price at Baltimore.
1861.....	\$3 44	1866.....	\$5 94
1862.....	4 23	1867.....	4 97
1863.....	5 57	1868.....	4 71
1864.....	6 84	1869.....	4 97
1865.....	7 57	1870.....	4 72

Year.	Average Price at Baltimore.	Year.	Average Price at Baltimore.
1871.....	\$4 72	1874.....	\$4 63
1872.....	4 66	1875.....	4 42
1873.....	4 85	1876.....	3 75

The year last past was a very unfortunate one for the operators of this region ; the opposition of the Railway carrying interest, controlling the outlet to market, tending to check the trade. The rates for coal at Baltimore and Georgetown were low, coastwise freights were favorable, and had the railway shown any disposition to foster the trade, a largely increased business might have been recorded, instead of a large deficit. This season may show an improvement in all this, as the cost of digging the coal has been reduced fifteen cents per ton. The rate of tolls over the line passing through the district, have been made to conform to the strict letter of the law, (a reduction from the rates of 1875, of one cent per ton, per mile). The C. & O. Canal and the B. & O. railroad each appear to have awakened to the necessity of fostering the trade, in every way, and we may look for better times in this connection. The scheme to construct a narrow gauge road from Lonaconing to Cumberland, will help the operators of this district as furnishing an additional outlet, and at the same time acting as a competitor.

The entire length of this coal field is from fifty to sixty miles : viz, from the head waters of George's Creek, near Frostburg, about fifteen miles to the north-east of Piedmont, to those of the north branch of the Potomac, some thirty miles to the south-east. The width of this valley averages six miles from outcrop to outcrop of the lower seams of coal. It is narrowest at the northern end, and widens out considerably at the southern. The total thickness of the coal containing strata is about 1400 feet, but this thickness does not pervade the entire area, as to the south of Piedmont and Bloomington the erosion has been greater, and it is only a few isolated hills that contain the upper seams of coal, notably the "big" or fourteen feet seam.

In the entire thickness there are many seams of coal, but there are only five or six of a thickness of three feet or over, as follows : commencing with the lowest, known as the "Parker" and "Bluebaugh" veins at the northern end of the region, and which lie near the bottom of the formation, and are crossed by the river and railroad at Piedmont.

About 150 feet above is the 6 feet seam.

About 300 feet above is the 3 feet seam. (Savage.)

About 380 feet above is the 5 feet 8 inch seam.

About 600 feet above is the 5 feet 9 inch seam.

About 850 feet above is the 14 feet or "Big Vein."

The coal from the smaller veins will hardly come into general use, while that from the other and larger, continues to be offered at so low a rate, as at present. Yet there have been many openings made in these smaller seams, they are of good quality and a considerable quantity has been disposed of last season.

The following statement shows the production of each company, operating in this region, during the years 1875 and 1876.

Company.	Tons in 1876.	Tons in 1875.
Consolidation	356,817	440,923
New Central.....	241,218	258,847
George's Creek C. & I. Co.....	198,796	166,357
Atlantic & George's Creek.....	149,930	122,916
Borden.....	145,818	232,458
American	127,942	180,125
Virginia Coal & Iron Co.....	101,615	31,181
Hampshire & Baltimore.....	94,589	153,685
Maryland.....	77,295	261,309
Swanton.....	67,196	68,559
Franklin	64,012	98,447
George's Creek Mining.....	61,885	85,881
Potomac	58,326	68,674
Blaen Avon.....	43,288	60,282
Piedmont	36,601	55,342
North Branch	7,108	26,490
New Reading.....	1,606	19,399
George's Creek Valley.....	1,039	.....
Davis mines .....	.....	5,866
Totals.....	1,835,081	2,342,773

IMPORTS AND EXPORTS OF COAL.

By the courtesy of Dr. Edward Young, Chief of the Bureau of Statistics, at Washington, D. C., we are enabled to give the following in regard to the imports and exports of coal into and from the United States :

IMPORTS.		EXPORTS.	
Years.	Tons.	Years.	Tons.
1870.....	420,688	1870.....	227,918
1871.....	443,955	1871.....	277,951
1872.....	490,631	1872.....	401,078
1873.....	456,015	1873.....	584,633
1874.....	498,028	1874.....	763,402
1875.....	441,600	1875.....	519,345
1876.....	407,853	1876.....	568,076

Details of the exports for the fiscal year ending June 30, 1876, including all kinds of coal are as below: It may be regarded as certain that coal to Nova Scotia, Quebec, Ontario, etc., was mainly Anthracite, the other exportations representing Bituminous Coal. The total exports of Anthracite was 337,934 tons, Bituminous amounting to 230,144 tons.

	Tons.
To Brazil	2,144
To China.....	3,782
To Danish West Indies.....	4,784
To Nova Scotia	33,087
To Quebec, Ontario, &c.	445,352
To Mexico	2,590
To Cuba.....	44,965
To United States of Columbia.....	23,679
To other countries	7,695
Total.....	568,078

Imports and exports:	Calender year 1876.	Year 1875.
Imports Bituminous Coal.....	488,132	411,723
Exports Bituminous Coal.....	253,387	234,997
Exports Anthracite Coal.....	362,044	361,669

The imports of coal into the United States since 1821 have been:

Year.	Tons.	Year.	Tons.
1821.....	22,419	1830.....	53,582
1822.....	34,672	1831.....	36,508
1823.....	30,535	1832.....	72,978
1824.....	20,440	1833.....	92,432
1825.....	25,795	1834.....	71,626
1826.....	34,643	1835.....	59,968
1827.....	40,264	1836.....	108,432
1828.....	32,364	1837.....	153,450
1829.....	45,463	1838.....	129,082

Year.	Tons.	Year.	Tons.
1839.....	181,555	1855.....	287,408
1840.....	162,867	1856.....	293,507
1841.....	155,394	1857.....	360,712
1842.....	141,521	1858.....	396,628
1843.....	41,163	1859.....	403,928
1844.....	87,073	1860.....	398,986
1845.....	85,766	1861.....	465,434
1846.....	156,853	1862.....	541,099
1847.....	148,021	1863.....	624,378
1848.....	196,168	1864.....	567,738
1849.....	198,213	1865.....	684,180
1850.....	180,439	1866.....	696,093
1851.....	214,774	1867.....	521,305
1852.....	183,015	1868.....	396,128
1853.....	231,508	1869.....	423,566
1854.....	252,865	1870.....	420,683

The tariff from 1824 to 1843, was six cents per bushel, or \$1.68 per ton; from 1843 to 1846, \$1.75 per ton. 1846, 30 per cent advalorem; 1847 to 1861, 24 per cent advalorem, 1862-3-4, \$1.00 per ton; 1865, \$1.10; 1866 to 1872, \$1.25 per ton; 1872, (August) 75 cents per ton. During the period from June 1854 to March 1866 the Reciprocity treaty was in force, and coal from the British possessions in North America, was admitted into the United States duty free.

NOVA SCOTIA.

The coal from the mines in this Province has always found a market in the United States, to a greater or less extent; of late there has not been so much received here, for the reason that the domestic mines of Bituminous coal have been more extensively worked, freights have been at low rate on land and water; this, together with the depression in general business pursuits since the financial panic of September 1873, has had its influence upon the product and sales, as may be seen from the schedules given. The Government Inspector of Mines, H. S. Poole, furnishes the following summary of the coal sales in Nova Scotia.

Years.	Tons.	Years.	Tons.
1785 to 1790.....	14,349	1831 to 1840.....	839,981
1791 to 1800.....	51,048	1841 to 1850.....	1,533,798
1801 to 1810.....	70,452	1851 to 1860.....	2,399,829
1811 to 1820.....	91,527	1861 to 1870.....	4,927,339
1821 to 1830.....	140,820	A total of.....	10,069,143
For 1871.....	596,418	For 1872.....	785,914
For 1873.....	881,106	For 1874.....	749,127
For 1875.....	706,795	For 1876.....	634,207

The duty on coal imported into the United States from any foreign country is seventy-five cents per ton, gold, or the round or coarse coal, and forty cents per ton, on the culm or slack; that is the coal which passes through bars not wider than three quarters of an inch. About eight per cent of the coal sold is culm, we give below the duty at various dates.

1846 to 1862.....	24 per cent advalorem.
1862-3-4.....	1.00 per ton.
1865.....	1.10 per ton.
1866-1872.....	1.25 per ton.
1872 to date.....	75 cts., per ton.

Reciprocity Treaty in force from June 1854 to March 1866.

Number of tons *actually raised* during a term of years.

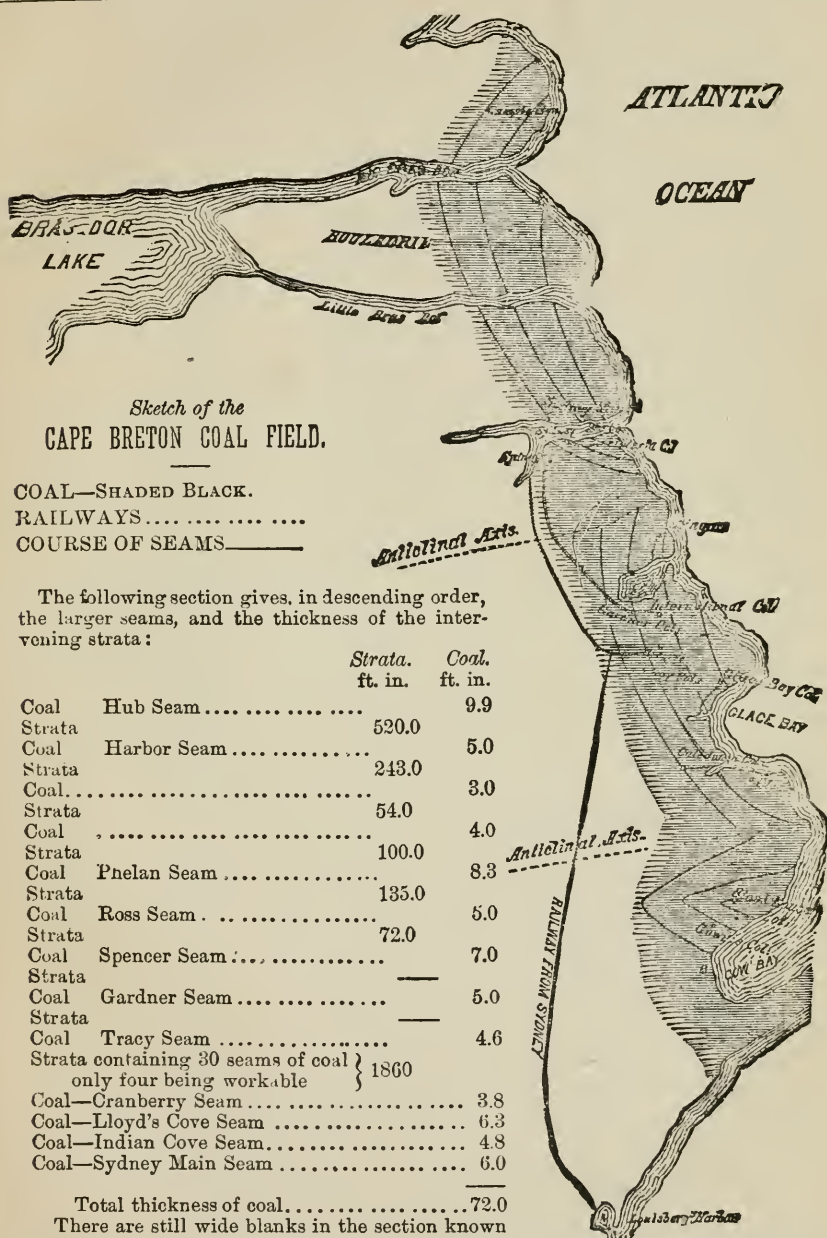
Year.	Tons.	Years.	Tons.
1864.....	562,102	1870.....	625,769
1865.....	715,786	1871.....	673,242
1866.....	664,998	1872.....	880,950
1867.....	517,525	1873.....	1,051,467
1868.....	462,188	1874.....	872,720
1869.....	578,062	1875.....	781,165
1876.....			709,646

Comparing the *sales* of 1876 with previous years, we obtain the following table:

County.	1876.	1875.	1874.	1873.	1872.
Cumberland.....	84,528	60,944	49,599	26,345	14,153
Pictou.....	275,618	337,102	357,926	333,974	388,417
Cape Breton.....	268,808	304,702	337,016	520,189	380,373
Other counties.....	5,253	4,047	4,586	588	3,070
Total tons.....	634,207	706,795	749,127	881,106	785,814

The destination of the coal sold during the year 1876, together with a comparison of the "*markets*" for each year is shown below:—

Markets.	1876—Tons.	1875—Tons.	1874—Tons.	1873—Tons.
Nova Scotia.....	225,658	212,630	214,965	215,295
Quebec.....	117,303	189,754	162,169	187,059
New Brunswick.....	101,890	85,968	78,841	68,217
Newfoundland.....	51,742	62,348	55,696	55,867
P. E. Island.....	46,908	43,641	41,948	26,840
United States.....	71,634	88,746	138,395	264,760
West Indies.....	17,971	16,429	47,844	54,213
South America.....		4,779	5,077	1,885
East Indies.....		1,003		
Great Britain.....	1,101	497	4,152	6,976
Total.....	634,207	706,795	749,127	881,106



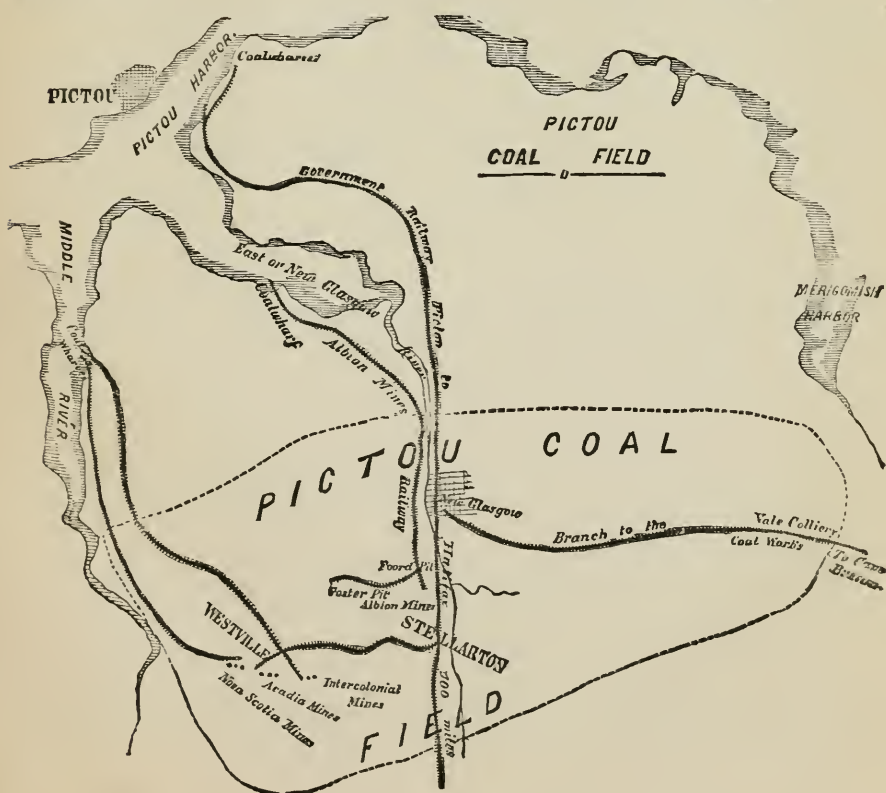
Production of each colliery for the years 1874, 1875 and 1876.

DISTRICT.	1876. Product.	1875. Product.	1874. Product.
CUMBERLAND COUNTY.			
Cumberland	5,053	336	—
Lawrence	—	60	27
Seaman	—	528	—
Scotia	1,286	1,460	1,741
Joggins	14,296	11,908	16,685
Spring Hill	72,595	50,505	33,137
PICTOU COUNTY.			
Acadia	60,280	65,992	110,734
Albion Deep	136,273	46,948	41,188
Albion Main.	—	90,121	94,343
Intercolonial	53,872	72,016	68,069
Whitehall	—	214	90
Nova Scotia	21,375	60,824	56,953
Vale	34,590	46,547	39,099
CAPE BRETON COUNTY.			
Blockhouse	34,819	23,064	28,897
Caledonia	30,789	16,566	39,388
Collins	7,693	662	—
Emery .....	.....	8,356	22,137
Gardiner .....	....	10,400	20,196
Glace Bay	30,022	22,734	46,535
Gowrie	20,275	23,924	32,857
Ingraham	40	150	67
International	24,111	40,489	36,385
Lingan	15,289	22,805	19,697
Ontario	11,095	5,653	7,070
Reserve .....	.....	9,493	28,769
Schooner Pond .....	.....	.....	1,523
South Head	653	1,116	....
Sydney	102,644	124,199	105,487
Victoria	17,672	18,814	15,310
INVERNESS COUNTY.			
Port Hood	2,548	720	35
VICTORIA COUNTY,			
New Campbellton	3,362	4,561	5,961
<hr/>			
Total tons of coal raised	709,646	781,165	872,720

The ton weight designated is that of 2,240 pounds, in all cases. The coals raised are used for gas, steam and domestic purposes generally, and find favor where they have been used. It will have been noticed that the most important districts are Pictou and Cape Breton; the former coal field is said to contain some twenty-eight square miles, while the latter extends along the coast for thirty-five miles, there are many seams of workable coal

that have not yet been developed, and further discoveries are constantly being noticed. We append an analysis of certain of the coals, tested for gas purposes. Albertite, a variety of Asphalt yielding 14,500 cubic feet of 54 candle illuminating power gas to the ton, is found in New Brunswick. Coke is being made from the slack, for use among the iron industries, and this must prove a source of wealth to the Provincial coal owners.

Seam.	Cubic feet per ton.	Candle power.	Chemist.
Victoria.....	9,340	.....	.....
Albion.....	7,180	15	Johnson.
Mc Gregor.....	9,500	13	Manhattan Co.
Blockhouse.....	10,217	17	Manhattan Co.
Phelan.....	9,500	16.5	.....
Emery.....	9,500	.....	Percy.
Hub.....	9,560	13	.....
Hub.....	10,080	16	Harrington.
Harbor.....	9,846	16.7	.....
Harbor.....	10,106	17	Harrington.
Lingan.....	9,900	17	Imperial Gas.
Lingan.....	9,520	13	Chandler.
Sydney (Main).....	9,500	.....	How.
Mc Auley.....	9,000	15	Richard.



VANCOUVERS ISLAND.

This island is located on the western coast of North America, and is within the limits of the Dominion of Canada. The coal area is estimated at 390 square miles. A considerable portion of the coal supplied to San Francisco, Cal., is brought from this island. The tonnage produced is stated as below :

Year.	Tons.	Year.	Tons.
1870.....	29,863	1874.....	81,397
1871.....	45,000	1875.....	113,000
1872.....	46,148	1876.....	140,087
1873.....	45,728		

COAL IN SPAIN.

There are said to be something like 3,501 square miles of coal producing area in this country; in the provinces of Castile, Leon, and the Asturias. The figures of the production for a term of years, are as below—expressed in tons of ten metric quintals=2200 lbs.

Year.	Tons.	Year.	Tons.
1870.....	414,482	1873.....	589,707
1871.....	500,000	1874.....	600,000
1872.....	570,000	1875.....	560,000

COAL IN ITALY.

The product of coal in Italy, in 1874, was 2,000 tons of Anthracite (?) 90,500 tons of Brown coal, and 90,000 tons of Peat coal.

FRANCE.

Probably one million tons of what is known as Anthracite, and the same quantity of soft Anthracite, are annually produced in France, the balance being Bituminous coal.

The production of coal in France, since 1787, has been as follows (tons of 2200 pounds, or ten metric quintals) :

Year.	Tons.	Year.	Tons.
1787.....	211,160	1821.....	1,114,448
1802.....	829,105	1826.....	1,513,482
1811.....	759,878	1831.....	1,728,950
1816.....	924,823	1836.....	2,789,858

Year.	Tons.	Year.	Tons.
1841.....	3,349,303	1869.....	13,108,662
1846.....	4,389,532	1870.....	6,550,000
1852.....	4,816,306	1871.....	13,400,000
1857.....	7,755,987	1872.....	15,899,005
1862.....	10,102,116	1873.....	17,500,000
1867.....	12,148,223	1874.....	17,059,547
1868.....	13,253,876	1875.....	16,949,031

M. Burat divides the coal-measures of France into five distinct geographical groups.—The coal-measures of the North of France form a long and narrow zone which crosses Belgium, and lies at the surface from Aix-la-Chapelle to beyond Mons. It can be followed for 250 miles in the line of Liege, Charleroi, Valenciennes, Douai, Bethune, with offsets into the Boulgne district, Rety, Ferques, Fiennes, and Hardingham, where it begins to make its descent below the Channel, to reappear in England. The surface of this great basin is about 625,000 acres in extent, the breadth of the carboniferous zone varies from 20 feet to 33,000 feet. France, however, owns but the small share of this measure which lies in the departments of the Nord and the Pas-de-Calais.—In the coal-measures of the east of France are comprised the basin of the Saar and that of Ronchamps (Haute-Saone). The Saar basin, which is above ground in Prussia, is continued below ground under the secondary formations of the Moselle, just as the great Belgian basin is continued along the right bank of the Rhine to form the rich basin of the Ruhr. With this group we may connect the Alpine offsets of Savoy and the Valais.—The western coal-measures, comprising the basins of the Basse-Loire, and of La Vendee, yield anthracite and anthracite fuel.—The coal-measures of the centre comprise the rich fields of Saone-et-Loire, the Al'ier, the Loire, and Auvergne. The basin of the Loire alone has a superficial area of about 64,000 acres, that of Saone-et Loire, 108,000 acres.—The coal-measures of the south, situated in the valleys of the Lot, the Herault, and the Gard, comprise several basins, the two most important of which are the colliery groups of the Aveyron and the Gard, comprising between them an area of 67,220 acres. At the extremity of the chain of the Alps, there is a small open coal-field, cropping up at different points of the Var.

These various measures are isolated one from the other by mountain masses, valleys, and strata belonging to different geological periods. The irregular conditions under which French coal is found adds considerably to the cost of winning.

France imports from England and Belgium, some six millions of tons of coal annually; the amount from the former country being 2,558,678 tons in 1875, and 3,250,559 tons in 1876.

GREAT BRITAIN.

MINERALS PRODUCED IN GREAT BRITAIN.

MINERALS.	Tons raised in 1873.	Tons raised in 1874.	Tons raised in 1875.
Coal.....	127,016,747	125,043,257	131,867,105
Iron ore.....	15,577,499	14,844,936	15,821,060
Copper ore.....	80,188	78,521	71,528
Tin ore.....	14,885	14,039	13,995
Lead ore.....	73,500	76,201	77,746
Zinc ore.....	15,969	16,830	23,978
Iron pyrites.....	58,924	56,208	48,035
Arsenic.....	5,448	6,268	5,061
Manganese.....	8,671	5,778	3,205
Ochre, Umber, etc.....	6,368	7,122	5,315
Wolfram.....	50	32	46
Fluor spar.....	.....	634	358
Barytes.....	10,269	14,374	15,549
Clays—fine and fire, and shale.....	1,785,000	2,436,912	3,450,780
Coprolites.....	.....	149,654	250,122
Salt.....	1,785,000	2,306,567	2,316,644

METALS OBTAINED FROM THE ORES ENUMERATED.

	1873—tons.	1874—tons.	1875—tons.
Iron, pig.....	6,556,451	6,991,408	6,365,462
Tin.....	9,972	9,942	9,614
Copper.....	5,240	4,981	4,322
Lead.....	54,235	58,777	57,435
Zinc.....	4,471	4,476	6,715
Silver.....(ozs.)	537,707	509,277	487,358

Absolute total value of the metals and coal, with other minerals which are not smelted (except building stone, lime, slate, and common clay,) produced in the United Kingdom:

	1873.	1874.	1875.
Value of the metals produced.....	£21,409,878	£19,539,070	£18,476,746
Value of the coal.....	47,629,787	45,849,194	46,163,486
Value of other minerals.....	1,681,834	2,446,049	2,847,456

Total..... £70,721,499 £67,834,313 £67,487,688

The ton weight in all cases, is 2240 pounds.

The amount of coal exported from Great Britain, during the year 1876, was as follows :

Countries.	Tons.	Countries.	Tons.
Russia.....	1,182,384	Turkey.....	294,214
Sweden and Norway.....	1,156,855	Egypt.....	543,668
Denmark.....	777,297	Brazil.....	327,084
Germany.....	2,271,901	Malta.....	298,858
Holland.....	478,993	British India.....	750,182
France.....	3,250,599	Other Countries.....	2,945,538
Spain and Canaries... ..	762,031	Coal, etc., for steamers en-	
Italy.....	1,226,205	gaged in foreign trade....	3,564,524

Grand Total..... 19,930,363

The production of coal in each district, during the year 1875, was as below:

County.	No. of Collieries.	Tons Produced.
North Durham and Northumberland	170	12,640,789
South Durham	177	19,456,534
Cumberland and Westmoreland	39	1,226,737
Cheshire	37	658,945
Lancashire, North and East	400	8,825,798
Lancashire, West	188	8,250,246
Yorkshire	523	15,425,278
Derbyshire	255	7,091,325
Nottinghamshire	46	3,250,300
Warwickshire	31	779,750
Leicestershire	25	1,154,619
South Staffordshire and Worcestershire	442	10,251,791
Staffordshire, North	157	4,456,213
Shropshire	64	1,229,785
Gloucestershire	90	1,273,080
Somersetshire	40	654,878
Monmouthshire	91	3,525,975
North Wales	124	2,337,308
South Wales	415	10,632,597
Scotland, East	334	11,419,619
Scotland, West	232	7,177,888
Ireland	53	127,950

Making the grand total of the United Kingdom..... 3,933 131,867,105

The following will show the exportation of coal since 1854 :

Year.	Tons.	Year.	Tons.
1854.....	4,300,000	1866.....	9,053,721
1855.....	4,900,000	1867.....	10,415,787
1856.....	5,800,000	1868.....	10,837,804
1857.....	6,600,000	1869.....	10,588,425
1858.....	6,500,000	1870.....	11,495,002
1859.....	7,000,000	1871.....	12,851,957
1860.....	7,400,000	1872.....	13,211,961
1861.....	7,200,000	1873.....	12,712,222
1862.....	7,600,000	1874.....	13,927,205
1863.....	7,500,000	1875.....	14,475,036
1864.....	8,809,908	1876.....	19,931,363
1865.....	9,170,477		

The receipts of coal at London for a series of years have been as below:

Year.	By Sea.	By Canal.	By Rail.	Total.
1863.....	3,161,683	8,532	2,733,056	5,903,271
1866.....	3,033,193	10,176	2,969,896	6,013,215
1867.....	3,016,416	9,965	3,295,652	6,322,033
1868.....	2,918,230	9,527	2,979,333	5,907,090
1869.....	2,873,688	6,941	3,341,585	6,212,214
1870.....	2,993,710	7,301	3,758,089	6,759,100
1871.....	2,762,712	6,615	4,449,141	7,218,468
1872.....	3,548,918	8,236	4,999,268	7,556,422
1873.....	2,665,630	11,195	5,147,413	7,824,288
1874.....	2,727,719	5,982	4,689,785	7,423,486
1875.....	3,134,846	4,594	5,065,452	8,204,892

AUSTRIA.

This country contains some thing like eighteen-hundred square miles of coal producing area, and may be regarded as one of the richest coal-producing nations of Europe. It is only recently that this has been turned to profitable account. In 1818 the production of coal in Austria and Hungary was 84,450 tons; in 1828 it was 153,950 tons; in 1838, 299,100 tons; in 1848, 838,000 tons, and in 1858, this had increased to 2,598,800 tons. About one-half of the coal produced is Lignite or Brown coal. We give statistics of the production, for a number of years :

Year.	Tons.	Year.	Tons.
1860.....	3,128,478	1868.....	6,199,027
1861.....	3,629,662	1869.....	6,685,161
1862.....	4,064,718	1870.....	6,443,575
1863.....	4,083,820	1871.....	9,891,350
1864.....	4,101,698	1872.....	10,389,952
1865.....	3,732,416	1873.....	10,500,000
1866.....	4,369,582	1874.....	11,000,000
1867.....	5,445,391	1875.....	10,895,000

RUSSIA.

The total area of coal fields of this Empire, is estimated to be thirty thousand square miles; the chief sources of supply, are, the basin of the lower Don, which amounts to nearly one-half of this area, the coal being what is said to be Anthracite; in the West, the government of Kiev and Kharkoff; further to the north, the great central basins, comprising the governments of Tver, Kalouga, Moscow, Ruzin, Tula and Novgorod, extending northward as far as the Dwina. To these items may be added that of the Kharkoff beds of Anthracite, and private coal beds of the districts lying to the east of the Vistula.

We are enabled to give the following statistics of the production. It will be noticed that the coal industry is rapidly developing in this country :

Year.	Tons.	Year.	Tons.
1870.....	817,008	1873.....	1,123,940
1871.....	829,722	1874.....	1,343,558
1872.....	1,097,832	1875.....	1,750,000

COAL IN INDIA.

The coal area of the Indian Empire, is stated at 2,004 square miles; the production is rapidly increasing until now an annual output of one million tons is recorded. We have this official statement, that in 1875, some 850,000 tons were mined, as against 500,000 tons in the year 1870.

BELGIUM.

The coal area of the kingdom is stated at 510 square miles; as will be seen from the figures given below, the production is quite large, having averaged something like fifteen million tons annually, for some years past. The province of Hainaut furnishes the largest proportion, 10,698,130 tons having been mined there during the year 1875; there is an export trade of about four million of tons to France and Germany, and an import of half a million tons. from Great Britain.

Progress of the coal output in Belgium.

Years.	Tons.	Years.	Tons.
1836.....	2,056,464	1870.....	13,691,118
1846.....	5,037,403	1871.....	13,733,176
1856.....	8,212,419	1872.....	15,158,948
1866.....	12,774,662	1873.....	15,778,401
1867.....	12,755,822	1874.....	14,669,029
1868.....	12,298,589	1875.....	15,011,311
1869.....	12,926,894	1876.....	.....

The Belgian ton is 1000 kilogrammes=2,200 pounds English.

NEW SOUTH WALES.

One of the most important coal producing countries of the globe is that portion of Australia, known as New South Wales; the trade has sprung up within a very few years, and the outlook for the trade is most encouraging, as the coal has been found equal to the English steam coal, and adopted by the home government; the approximate area of the coal fields is 24,840 square miles; the production from the opening of the mines up to the year 1874, has amounted to 12,387,279 tons, valued at £6,655,328, there was raised in the year 1874, 1,304,567 tons, of which 872,980 tons was sent out of the country; the cost of raising the coal is less than one dollar per ton, while the selling price, f. o. b. vessel, is three dollars and a half per ton. The coals produced are of various qualities, as will appear from the following statements.

In the Newcastle district is found Bituminous coal, used for steam, household, smelting, gas, blacksmith, and coking purposes. At Four-mile Creek and Branxton, &c., in the Northern district, there are Splint and Bituminous coals, suitable for steam, household, gas, smelting, blacksmith, and coking purposes.

In the Western district at Lithgow Valley, Hartley, and Mudgee Road, is found the Splint coal used for household, steam, smelting, gas. black smith, and coking purposes.

In the Southern or Illawarra district, Semi-Bituminous coal, used for steam, household, smelting, and blacksmith purposes is found.

At present the Newcastle district sends out upwards of ninety per cent. of the whole production; in the Western district is found the Bituminous shale, which is distilled for illuminating oil, and also used in its raw state, as an enricher for gas, as it yields 14,198 cubic feet of gas, of 74.08 candle power; the seam is only a few inches in thickness, and is worked by an adit on the outcrop.

W. B. Clarke, M. A., in his report on the sedimentary deposits of New South Wales, embodied in the government reports, speaks of the geological position of the shales thus :

"Recent researches have satisfied me that these only belong to the upper coal measures. It has unquestionably resulted from the local deposition of some resinous wood, and passes generally into ordinary coal. There is no anomaly in finding in one spot a mere patch in a coal seam as at Anvil Creek, on the Hunter River; or thick bedded masses, as in the coal seams of Mount York, the thickness depending on the original amount of drift timber."

W. Keene, F. G. S., government examiner of coal fields, says :

"The lower beds of the coal series of New South Wales are geologically older than any worked in Europe, while the upper beds represent the most recent of the European true carboniferous formation. I have examined seams more than seven hundred miles to the north of Newcastle, belonging to the same deposits we are working here (Newcastle) and we may, without boasting, claim to rank with the most extensive coal fields in the world."

It is stated that although the kerosene shale has only been worked at Hartley and Wollongong, it may possibly be found in connection with any of the different coal seams, and as these spread over an enormous area of country, it is impossible to place any limits on the quantity of this peculiar mineral that the colony may possess.

We are enabled to give the following statistics of the coal production :—

Year.	Tons.	Year.	Tons.
1864.....	549,012	1870.....	868,564
1865.....	585,525	1871.....	898,784
1866.....	774,238	1872.....	1,012,426
1867.....	770,012	1873.....	1,092,862
1868.....	954,230	1874.....	1,298,400
1869.....	919,773	1875.....	..

CHICAGO, ILL.

This city is in direct rail and water communication with the Anthracite coal mines, and is therefore freely supplied at low rates, and the startling result is shown, that although the railway system connecting this city with many of the Western Bituminous coal fields is so thoroughly complete, the amount of Anthracite now received, exceeds the quantity of Bituminous of all other kinds. The Anthracite coal Association of Pennsylvania, own their own roads from the mines to Buffalo and Oswego, and can lay down coal at either port at a moderate rate. Anthracite coal is largely exported from this city to St. Louis, Missouri, Kansas and Nebraska, also to Wisconsin, Iowa and Minnesota. The rates of freight from Buffalo to Chicago during the year 1876, were from twenty-five cents to one dollar and twenty five cents per net ton.

Chicago is now one of the most important markets in the country for soft coal, for local manufacturing and other purposes, and is the distributing point for a large section of the Northwest.

The receipts for the years 1874, 1875 and 1876, are shown below :

Received By.	Tons—1874.	Tons—1875.	Tons—1876.
Lake.....	661,583	748,706	711,572
Illinois and Michigan Canal.....	11,646	7,778	5,292
Chicago and Northwestern Railroad.....	2,092	5,564	.....
Illinois Central Railroad.....	35,921	38,288	16,348
Chicago, Rock Island and Pacific Railroad.	18,135	31,893	22,703
Chicago, Burlington and Quincy Railroad...	27,661	5,821	10,986
Chicago and Alton Railroad.....	254,030	278,006	293,807
Chicago, Danville and Vincennes Railroad...	147,701	205,530	196,865
Lake Shore and Michigan Southern.....	455	778	55,205
Pittsburgh, Ft. Wayne and Chicago Railroad	64,314	112,609	142,691
Pittsburgh, Cincinnati and St. Louis Railroad	133,232	150,349	106,774
Baltimore and Ohio Railroad.....	2,726	57,900	17,804
Michigan Central Railroad.....	.....	3,266	38,774
Total.....	1,359,496	1,641,488	1,619,033

The ton weight designated in these tables is that of 2,000 pounds.

The shipments from the city are by railway, mainly by the Chicago and Northwestern Railroad, to points in the Western States, and foot up 249,-862 tons for the year 1876.

The following tables evidence the growth of the coal trade at this city :

RECEIPTS BY LAKE.					
Years.	ANTHRACITE.	Tons.	Years.	BITUMINOUS.	Tons.
1870.....		340,730	1870.....		181,850
1872.....		495,765	1872.....		90,820
1873.....		538,837	1873.....		199,107
1874.....		404,333	1874.....		257,200
1875.....		474,812	1875.....		365,817
1876.....		373,146	1876.....		338,426

TOTAL RECEIPTS AT THE CITY OF CHICAGO.

Year.	Tons.	Year.	Tons.
1852.....	46,233	1864.....	323,275
1853.....	38,548	1865.....	344,854
1854.....	56,774	1866.....	496,193
1855.....	109,576	1867.....	546,208
1856.....	93,020	1868.....	658,243
1857.....	171,379	1869.....	799,000
1858.....	87,290	1870.....	887,474
1859.....	131,204	1871.....	1,081,472
1860.....	131,080	1872.....	1,398,024
1861.....	184,089	1873.....	1,668,257
1862.....	218,423	1874.....	1,359,496
1863.....	284,196	1875.....	1,641,488
1876.....			1,619,023

BUFFALO, N. Y.

The distribution of the coal received here is divided into city trade for family use, rolling mills, furnaces, manufactories and gas works; interior trade for gas works, family use and manufacturing purposes; and all points of the West are supplied, principally with Anthracite, which is taken by vessels from this port to Chicago, Milwaukee, Duluth, etc.

The receipts for a series of years have been as below:

Year.	—BITUMINOUS.—				—ANTHRACITE.—	
	By Lake.	By Canal.	By L. S. & M. S. R. R.		By Canal.	By Rail.
1863.....	71,323	12,551	.....		123,319	.....
1864.....	65,214	35,237	.....		154,214	.....
1865.....	68,141	42,322	.....		143,998	.....
1866.....	68,142	62,172	.....		248,716	.....
1867.....	101,107	67,124	.....		223,718	.....
1868.....	91,457	73,596	.....		318,353	.....
1869.....	99,460	108,972	.....		112,914	187,000
1870.....	94,796	163,437	.....		177,027	250,000
1871.....	88,511	80,660	76,063		102,185	300,000
1872.....	78,879	95,500	109,397		190,994	330,000
1873.....	87,724	125,000	190,000		255,044	479,885
1874.....	67,467	70,000	140,000		252,262	320,000
1875.....	32,767	45,000	350,000		250,206	500,000
1876.....	21,418	30,000	297,842		151,175	350,000

The shipments of Bituminous eastward by canal from Buffalo were as below:

Year.	Tons.	Year.	Tons.
1863.....	20,125	1870.....	65,900
1864.....	30,043	1871.....	60,522
1865.....	28,283	1872.....	53,198
1866.....	50,202	1873.....	68,210
1867.....	57,495	1874.....	46,995
1868.....	59,766	1875.....	23,100
1869.....	62,690	1876.....	19,153

There was 80,000 tons of Blossburg Semi-Bituminous received in 1873, 50,000 tons in 1874, 75,000 tons in 1875, and 25,000 in 1876 by railroad. The amount of Anthracite that was shipped westward, via the lakes, was 510,443 tons in 1873, 344,500 in 1874, 339,722 tons in 1875, and 321,455 in 1876. There was 60,000 tons of Blossburg Semi-Bituminous shipped west, via the lakes in 1873, 40,000 in 1874, 50,000 tons in 1875, and 40,000 in 1876.

Freights ranged from 25 cents to \$1 25 per ton to Chicago, Ills.

The ton weight in use here is that of 2,000 lbs.

ST. LOUIS, MO.

By far the largest proportion of the Bituminous coal received at this city is from the Belleville district, in St. Clair county, Illinois; the principal seam worked is five to seven feet in thickness, and is economically mined. Analysis of this coal shows, Water 6; Volatile matter 38.8; Fixed Carbon 55.2; Ash 5. The Iron Mountain Railroad brings the Semi-Anthracite coal known as the "Spadra" from Arkansas, to this city.

The following statement shows the receipts of coal at St. Louis for the five years last past.

ROUTE.	1876. Bushels.	1875. Bushels.	1874. Bushels.	1873. Bushels.	1872. Bushels.
Ohio and Mississippi Railroad.....	3,511,825	3,966,100	4,034,750	5,118,375	4,600,000
St. L. A. and Chicago "	12,500	44,500	108,000	75,000	273,750
Ind. and St. Louis "	316,750	456,200	620,000	388,350	341,825
Missouri Pacific " .....	.....	none	5,125	8,475	78,200
St. Louis and Iron M'n "	88,600	43,800	10,400	4,250	45,100
St. L., Vandalia & T. H. "	5,818,450	4,734,650	2,907,800	3,597,200	203,225
Belleville and Southern " ...	8,305,125	8,816,000	7,811,075	9,995,925	8,521,900
Toledo, Wab. & Western "	612,950	144,250	363,000	461,025	151,000
St. Louis & Southeastern "	4,347,900	4,302,000	3,982,500	3,155,975	2,279,625
Illinois and St. Louis "	5,242,375	5,121,675	4,831,525	4,535,734	3,045,300
Mo., Kansas & Texas " .....	.....	250	.....	.....	750
Cairo & St. Louis "	2,167,850	2,009,225	1,405,500	182,975	.....
From Ohio River.....	671,250	1,328,000	1,410,375	1,500,000	1,305,500
From Grand Tower.....	102,550	500,000	700,000	1,050,000	1,204,125
From Illinois River .....	.....	none	33,000	35,511	7,125
From St. Louis Co.—Estimated..	875,000	1,000,000	1,600,000	2,500,000	2,500,000
Total	32,073,125	32,466,650	29,823,050	32,608,795	24,557,425

25 bushels of 80 lbs. each, to the net ton of 2,000 lbs.

PROVIDENCE, R. I.

The total amount of coal reported as received at this port during the year 1876 was 610,339 tons. For 1875, 602,847 tons domestic and 663 tons foreign; for 1874, 539,169 tons, 532,564 tons domestic and 6,604 tons foreign; for 1873, 634,112 tons domestic, 3,232 foreign; for 1872, 623,842 tons domestic, 9,454 tons foreign; for year 1871, 504,006 tons domestic, 13,900 tons foreign.

BOSTON, MASS.

The receipts are shown below :

From	Tons, 1874.	Tons, 1875.	Tons, 1876.
Alexandria, Virginia.....	86,705	97,697	49,643
Georgetown, District of Columbia	27,753	20,567	12,945
Philadelphia, Pennsylvania.....	578,432	623,245	639,643
Baltimore, Maryland	197,513	168,798	151,118
Other places (New York, etc.).....	235,113	290,271	294,221
Great Britain.....	2,780	2,738	6,177
Nova Scotia	48,658	29,706	26,451
Total.....	1,175,954	1,233,022	1,180,204

The receipts of foreign and domestic coal at this port have been as follows :

Years.	Foreign. Tons.	Domestic. Tons.	Years.	Foreign. Tons.	Domestic. Tons.
1876.....	32,628	1,147,576	1869.....	110,466	764,017
1875.....	32,444	1,200,578	1868.....	103,901	742,481
1874.....	51,438	1,125,516	1867.....	117,440	680,221
1873.....	87,700	1,076,673	1866.....	159,380	676,376
1872.....	90,739	1,068,781	1865.....	209,225	538,917
1871.....	109,013	822,808	1864.....	188,786	516,665
1870.....	115,022	819,890	1863.....	180,445	589,921

These figures include all the coal going to this port, both for the home trade, and for the points reached by the railroads centering here.

The following are the highest and lowest prices for Anthracite and Provincial coal, for the years named, as per statistics of the *Commercial List*.

	Anthracite, per ton.		Nova Scotia. per ton.	
1876	\$6.00	@ \$8.25	\$4.75	@ \$6.00
1875	7.00	9.00	5.25	6.25
1874	7.00	9.00	5.75	7.75
1873	8.00	10.00	7.00	9.00
1872	7.00	10.00	6.00	8.50
1871	7.00	10.00	5.75	7.00

CINCINNATI, OHIO.

The coal received at this city includes Youghiogheny from the neighborhood of Pittsburgh, Pa.; the Pomeroy from the vicinity of Pomeroy, Ohio; Hocking Valley, Ohio; Muskingum, Ohio; Ohio River; the Kanawha from West Virginia, including the Splint, Bituminous and Cannel; and the Anthracite from Pennsylvania.

Of Anthracite coal, the quantity consumed in this city is small, not exceeding during the past year, 282,578 bushels. The price delivered to dealers is about \$9.75 per ton.

The shipments of coal from this city to interior towns have increased until they amount to 5,096,100 bushels against in 1874-75, 5,002,500 bushels, 5,933,100 bushels in 1873-74, and 4,472,400 bushels in 1872-3.

The following table will show the number of bushels of coal of all kinds, received at Cincinnati, for the years named.

Years.	Bushels.	Years.	Bushels.
1853-54.....	8,158,000	1864-65.....	16,467,023
1854-55.....	10,356,000	1865-66.....	18,022,990
1855-56.....	7,500,000	1866-67.....	18,446,226
1856-57.....	14,500,000	1867-68.....	17,500,000
1857-58.....	15,000,000	1868-69.....	25,500,000
1858-59.....	12,392,701	1869-70.....	30,300,000
1859-60.....	14,600,000	1870-71.....	22,972,000
1860-61.....	12,500,000	1871-72.....	30,790,796
1861-62.....	8,500,000	1872-73.....	37,274,497
1862-63.....	8,000,000	1873-74.....	35,234,834
1863-64.....	15,975,366	1874-75.....	35,360,300
1875-76.....	40,183,317		

It is safe to calculate the bushel at eighty pounds, which would give twenty-eight to the ton of 2,240 lbs.

DETAILS FOR THE SEASON 1875-76.

	Bushels.
Youghiogheny.....	27,017,592
Ohio River.....	4,400,792
Kanawha River.....	6,004,675
Muskingum Valley.....	177,730
Hocking Valley.....	1,350,000
Kentucky Cannel.....	409,358
Anthracite.....	282,578
Hocking and Muskingum Coal, not elsewhere included.....	540,592
Total for the season.....	40,183,317

SAN FRANCISCO, CAL.

The statements given below will serve to indicate the increased consumption of the several varieties of coal, at San Francisco. The principal sources

of supply are, from Mount Diablo, in the immediate vicinity, from Coos Bay and Bellingham Bay in Oregon, and Seattle in Washington Territories, from Vancouver Island, from Australia and Great Britain, as also Cumberland and Anthracite, from the Atlantic Coast; coal has also been received in small quantities from Chili, Sitka, Alaska and Japan.

Years.	Total Receipts.	Years.	Total Receipts.
1860.....	77,635	1868.....	282,025
1861.....	116,245	1869.....	328,973
1862.....	120,545	1870.....	320,493
1863.....	135,550	1871.....	315,194
1864.....	167,298	1872.....	434,467
1865.....	150,147	1873.....	454,582
1866.....	192,601	1874.....	531,947
1867.....	248,925	1875.....	538,209
1876.....	648,388.		

Details of business for the year 1876 are as below:—

FOREIGN.	Australian	131,695 tons.
	English.....	121,948 tons.
	Vancouver Island.....	100,965 tons.
	Chili.....	3,150 tons.
DOMESTIC.	Mount Diablo.....	108,078 tons.
	Coos Bay.....	41,286 tons.
	Bellingham Bay.....	21,335 tons.
	Seattle.....	95,314 tons.
	Rocky Mountain	226 tons.
EASTERN.	Cumberland.....	12,520 tons.
	Anthracite.....	11,871 tons.

Making the total of.....648,388 tons.

The ton weight is that of 2240 lbs.—

The following is of interest, as showing the relative value of the coals found on the Pacific coast compared with the coal from the Cumberland region in Maryland:

	A.	B.	C.	D.	E.	F.
Alaska	7.94	7.96	60.0	40.0	12.3	5.41
Coos Bay.....	10.24	7.35	60.7	39.3	6.2	6.91
Seattle	8.38	8.57	63.0	37.0	16.6	5.71
Black Diamond.....	8.38	8.73	51.6	48.4	8.0	5.71
Bellingham Bay.....	10.58	5.51	67.0	33.0	16.0	7.21
Anthracite	7.40	.....	95.6	4.4	7.2	5.04
Cumberland, Maryland.....	13.92	3.52	88.2	11.8	3.2	9.48

EXPLANATION.—A, heating power, one pound water; B, sulphur to ton, in pounds; C, coke per cent; D, Volatile matter; E, Ash per cent; F, relative value per pound.

BALTIMORE, MD.

At this city an extensive business in coal, both Anthracite and Bituminous, is done. Locust Point, the terminus of the Baltimore and Ohio Railroad, on the environs of this fine city, is the shipping point for the Bituminous coal from the Cumberland region of Maryland, the Gas coal regions of West Virginia, the Somerset county mines and the Youghiogheny Gas coal of Pennsylvania.

The highest price at which the Cumberland coal has been sold at Baltimore, was in March 1865, when the price was \$14 per ton; it rapidly declined, until, in December of the same year, the price was but \$7 40 per ton. The trade in Anthracite at present is entirely local, none being shipped from Baltimore to other and more distant points.

There are some 350,000 tons of Anthracite received yearly at Baltimore, by the following routes: From Millersburg, Pa., 112 miles, the Lykens Valley Red Ash; from Sunbury, Pa., 138 miles, the White Ash; by Susquehanna tide water canal; from Port Richmond, Philadelphia, via River and Canal. Little or no Lehigh coal reaches Baltimore. All the sales are 2,240 pounds to the ton. Anthracite sold as high as \$13.50 per ton for Lump coal, in May, 1865.

The gross rates of transportation, on coal for shipment at Locust Point over the Baltimore and Ohio Railroad, made at the opening of this years business, were as below:

Cumberland to Locust Point.....	\$1 62
Piedmont to Locust Point.....	1.90
Newburg to Locust Point	3.82
Clarksburg and Fairmount to Locust Point.....	4.32
Per ton of 2,000 lbs., with a drawback off Gas coal reshipped North and East.	

The shipments from Baltimore of Cumberland coal to foreign ports were as below:

1871.....	20,207	1874.....	70,675
1872.....	54,363	1875.....	33,460
1873.....	59,546	1876.....	27,336

The Northern Central Railroad carried to this city the following amount of Anthracite coal, in the year named.

1872.....	244,757	1874.....	232,938
1873.....	242,754	1875.....	276,784
1876.....			263,954

There is something like one hundred thousand tons of Gas coal received and shipped at this port annually; it was formerly, more than double this amount, but the rate of freight, per B. & O., has lately been so high, as to

throw the trade into the hands of operators in Pennsylvania; the coal received and shipped consists of Clarksburg and Fairmount, W. Va.; and the Youghiogheny, received from Western Pennsylvania, by the Pittsburgh and Connellsville branch of the Baltimore and Ohio Railroad.

The Pennsylvania Railroad began to carry the Bituminous coal from the Clearfield region of Pennsylvania to Baltimore in 1875, by its Northern Central line, and there has been quite a local and shipping business for this quality of coal, developed in this vicinity.

The following schedule shows the business of the Baltimore and Ohio Railroad Company, giving the disposition of the coal that paid freight (coal for the use of the company not included):

Fiscal Years.	Received at Locust Point.	To Balti- more.	Line Trade.
1862.....	150,987	8,740	978
1863.....	277,505	26,106	3,936
1864.....	302,277	56,181	1,103
1865.....	353,434	49,396	5,340
1866.....	620,888	77,856	20,967
1867.....	629,946	58,377	7,615
1868.....	696,465	39,766	29,780
1869.....	1,187,366	136,704	33,910
1870.....	1,069,390	113,929	36,319
1871.....	1,438,816	113,286	39,500
1872.....	1,482,240	60,630	118,389
1873.....	1,806,829	65,694	147,195
1874.....	1,407,377	—	—
1875.....	1,375,297	54,124	90,468
1876.....	1,068,754	47,059	71,476

The coal business of the Baltimore and Ohio Company, on main stem, was 1,596,894 tons, (including 409,605 tons for the company use,) and on Pittsburgh division 797,630 tons, for the first nine months of 1876, and on the Trans-Ohio divisions 228,834 tons, making the grand total of 2,623-358 tons. The year of the company ends September 30th.

RICHMOND, VA.

This city is assuming considerable importance through the efforts of the shippers along the line of Chesapeake and Ohio Railroad, to build up a trade for their coal at the east; if the railway company were in a position to make lower rates of tolls, an increased business might be done, as the Steam, Gas and Splint coals, produced upon property located upon and near to this route, are of the best quality. They stand unrivalled for all

the various purposes for which fuel is required. We append statistics of the total coal business, of the Chesapeake and Ohio Railroad.

Quality.	Tons in 1874.	Tons in 1875.	Tons in 1876.
Cannel.....	26,225	33,840	45,050
Splint and Bituminous	114,605	148,762	165,530
Coke.....	1,930	8,767	6,679
Totals.....	141,760	191,369	217,259

The shipments from the port of Richmond, during the year 1876.

Cannelton.....	33,912	33,134
Peytona.....	18,648	11,151
Coal Valley.....	10,772	8,914
Blacksburg.....	5,467	7,288

There was also some 7,200 tons of Kanawha coal shipped by other parties, in small lots. The amount of Chesterfield county coal, (per Richmond and Danville road,) received was 16,321 tons, of which 9,351 tons were shipped to other ports and places; there was 3,513 tons of the same quality received here, via Richmond and Petersburg road; the receipts of Cumberland and Anthracite amounted to 40,933 tons, a large decrease from former years; the tonnage of Virginia coal received by canal was 10,929 tons.

PITTSBURGH, PA.

The amount of business that was done at this city in coal and coke, including that sent to other points, amounted in 1876 to 4,424,04½ tons (of 2,000 pounds).

The rapid growth of the coke trade of Pittsburgh and vicinity is a most significant illustration of its industrial development. Of this trade, what is known as Connellsville coke forms a large part, and will continue to do so. It is mined in Fayette county, Pa. It is stated that an acre will yield, over and above the pillars, if properly mined, 13,300 tons. It weighs 80 lbs. to a bushel, and when properly coked, 100 bushels of coal produce 125 bushels of coke, and the coke weighs 40 pounds to a bushel; that is, a given quantity of the coal gains one quarter in bulk and loses three eighths of its weight, or 100 pounds of coal makes 62½ pounds of coke. The coke has become very celebrated not only about Pittsburgh, but throughout the Western States, where it is extensively used for foundry purposes in melting pig iron, selling in competition with Lehigh coal. It is used in blast furnaces for smelting iron from the ore, and is sometimes mixed with the Western coals. It is an excellent fuel for locomotive use. Its freedom from sulphur has given this coke the reputation of being the best known.

An analysis made by J. B. Britton of a sample of Connellsville coke, average of forty nine pieces, shows:

Moisture	49	Sulphur.....	69
Ash	11.33	Phosphoric Acid.....	.93
Carbon.....			87.46

The ash of the coke contained 47 per cent. of silica and 47 per cent. of alumina.

The receipts during the years 1875 and 1876 are shown in the following schedule

COAL RECEIPTS

	Tons—1875.	Tons—1876.
Pennsylvania Railroad	331,843	220,000
Pittsburgh & Connellsville R. R.	325,000	55,490
P. C. & St. Louis R.....	249,891	294,405
Saw Mill Run R. R.	90,019	148,654
P. V. & C. R. R.....	43,890	68,796
P. & Castle Shannon R. R.....	97,313	94,741
Alleghany Valley R. R.....	271,725	190,821
West Penn. R. R.....	150,000	192,685
Total by rail	1,559,711	1,267,595
By Slackwater	2,046,967	2,798,333
Grand Total	3,606,678	4,065,928

COKE RECEIPTS.

	Tons—1875.	Tons—1876.
Pennsylvania R. R.....	422,903	83,050
Pittsburgh & Connellsville R. R.	550,000	18,730
West Penn.....	45,000	53,170
Slackwater.....	38,308	203,166
Total.....	1,056,211	358,116

NEW ORLEANS, LA.

The coal brought to this market is almost exclusively Pittsburgh coal. The flats and barges are towed by powerful towboats built expressly for that purpose. The towing between Pittsburgh and Louisville depends on the state of the river. When the stage of water is too low for navigation, which it frequently is for weeks, and even months, the supplies at the lower points become deficient and prices naturally advance, often reaching very high prices. The coal flats and barges sent to New Orleans are generally dropped at Willow Grove, near Greenville, just above the city, where they are superintended for the owners or agents. When a boat or barge is wanted a small city tugboat is sent to tow it to the city, or to its destination on the coast.

The largest amount of coal consumed in the past six years, was 301,555 tons in 1869, and the least, 211,727 tons in 1875.

Messrs. C. A. Miltenberger & Co., give the following as the consumption of Pittsburgh coal at this port:

Year.	Bbls.	Year.	Bbls.
1869.....	3,317,000	1873.....	2,821,500
1870.....	3,203,500	1874.....	2,749,500
1871.....	3,112,000	1875.....	2,448,000
1872.....	2,991,500	1876.....	2,802,700

In addition to the figures for 1876, add some 84,000 bbls. of St. Bernard coal, from Kentucky. Boats average 9,000 bbls. Barges 4,500 bbls. French Creeks 3,400 bbls. It is estimated that eleven barrels make a ton of 2,000 lbs. The distance from Pittsburgh to New Orleans is some 2,000 miles, and the rate of freight is about $3\frac{1}{2}$ cts. per bushel.

MOBILE, ALA.

The receipts of coal at this port are very small, the demand being principally for household purposes. The boats, presses and manufactories continue to use pine wood, which can be freely obtained at about \$3 00 per cord—making a fuel so cheap as to prevent the substitution of coal until it can be furnished at a considerable reduction from present rates. Although samples of the Alabama coal have been sent to Mexico, Cuba and St. Thomas, there has been nothing done as yet, looking to an increased trade. The railroads freight the Alabama coal at as low a figure as they can afford, yet the cost is too high for successful competition with the Cumberland and Anthracite coals of America, and the coal from Great Britain or the Nova Scotia Provinces. The total coal business of the port, in 1872 was 9,920 tons; in 1873, 9,235 tons; in 1874, 6,984 tons; for 1875, 1,937 tons Alabama coal, and 3,179 tons English and Anthracite; for 1876, 1,105 tons Alabama, and 4,278 tons English and Anthracite. The improvement of the navigable streams that flow through the coal fields, to the Gulf of Mexico, would allow a large business to be done from this port, in the coals that are so abundant in the State of Alabama.

CLEVELAND, OHIO.

This city receives a fine and varied assortment of Bituminous coal. A great many coal basins—in fact, nearly all the Ohio formation, as well as most of the coals lying west of the Allegheny Mountains, in Pennsylvania—here find a market and a distributing point for the West, Northwest, Eastern and Canada trade.

The great number of vessels employed in the iron ore and lumber trade naturally seek coal as a back freight for ballast, which enables Cleveland to place coal in distant ports, like Chicago, Milwaukee and on Lake Superior, at mere nominal rates. The bulk of the business has been developed within the last fifteen years, and, taking the rapid growth of the manufacturing interests in the West into consideration, it is safe to presume that the trade has not yet reached its ultimate proportions.

The total receipts of coal at Cleveland from 1828 to 1852 amounted to 662,862 tons; having increased from thirty tons in 1828, to 137,926 tons in 1852; the coal being mined in the districts named below

Year.	District.	Tons for the Year.
1828	Tallmadge	30
1829	Tallmadge	708
1830	Tallmadge	1,178
1840	Tallmadge, New Castle, Trenton	6,023
1850	Tallmadge, Clinton, New Castle, Youngstown, Cuyahoga Falls, Girard and Rochester	83,850
1851	Tallmadge, Clinton, New Castle, Youngstown, Cuyahoga Falls, Girard and Rochester	107,135
1852	Tallmadge, Clinton, New Castle, Youngstown, Cuyahoga Falls, Girard and Rochester	137,926

The canal from Akron was opened July 4, 1828, and during that year the thirty tons of coal sent to Cleveland was received by this canal route. The coal was taken from the mines to the canal with teams, to be shipped, and the business was continued in this way until 1832, when the canal reached the coal fields near Massillon, which were on its banks. The receipts by this route represents the consumption of coal at Cleveland up to 1838. It was not until after this, and after the Briar Hill coal began to reach this place, in 1843, that lake steamers could be induced to use it. Since 1845 it has supplanted wood on the steamers of the lower lakes.

Until 1845 the entire trade of the lakes in Bituminous coal was in the hands of Cleveland dealers. About this time, possibly a year or two earlier, Erie began to ship coal, the joint receipts from the interior at the two places being only 45,136 tons.

We are not prepared to give official figures of the coal trade of this city, as their collection does not appear to be of any moment with the various companies. We are therefore compelled to make estimates, for some years, the following will serve to show the growth of the trade.

Year.	Tons.	Year.	Tons.
1865	465,550	1871	1,165,940
1866	583,407	1872	1,348,160
1867	668,026	1873	1,599,212
1868	759,104	1874	1,100,000
1869	922,757	1875	1,250,000
1870	904,600	1876	1,100,000

The ton designated is that of 2,000 lbs. It is safe to estimate that one half of the receipts as noted above, are sent to outside ports and places, via the lakes; the following will serve to show the destination.

	1875.	1876.
To ports in British Provinces	140,637	156,857
To Domestic ports	529,211	362,834

COLORADO.

The area of land known to be rich in lignite coal deposits in Colorado, is about 7,200 square miles, lying in various parts of the Territory, on both sides of the main range. There can hardly be a doubt but that this extent will be largely increased in years to come, for new discoveries are constantly being made upon the foot-hills and plains.

Separated under heads depending more upon their geographical position than upon the character of the fuel, we find :

- | | |
|------------------------------|---------------------------------|
| 1. The Northern mines. | 2. The Eastern foot-hill mines. |
| 3. The Southern mines. | 4. The Summit county mines. |
| 5. The Conejos county mines. | |

Of the first but little is known. Weld and Larimer counties are undoubtedly underlain by veins of lignite similar to those of Wyoming, which are at present furnishing an excellent fuel for steam engines, domestic purposes, and for some metallurgical processes. Coke made from the product of the Wyoming coal fields has been tried at both Golden and Denver for smelting silver and gold ores, and though discarded in favor of Pennsylvania coke, is considered to be a fair fuel.

The eastern foot-hill mines embrace outcroppings in Boulder and Jefferson counties, nearly all of which have been known since the early days. They are producing at present three-fifths of all the coal mined in Colorado, which is about 120,000 tons, being located nearer the centre of population than any of the other fields.

The main workings lie mostly upon the north side of Ralston Creek, which has cut through the bed and exposed its outcroppings very markedly on either side. Nearly 2,000 feet of the vein is opened. The coal is a very good sample of the product of all the foot-hill mines. It is an altered lignite that burns freely, and crumbles quickly on exposure to the rain or moist air; burns well under the boiler and in the grate, and answers excellently for nearly all the uses to which mineral fuel is put.

The following is an analysis made in 1871 by E. W. Rollins, of the Massachusetts Institute of Technology, Boston.

Hydrogen.....	4.00 per cent.
Carbon.....	66.50 per cent.
Ash.....	7.05 per cent.
Oxygen, Nitrogen and Sulphur.....	22.45 per cent.
	100.00

East of Denver, along the line of the Kansas Pacific, indications of coal are not wanting. The same formation that is found along the foot-hills, tilted up in a nearly vertical position, underlies the whole of eastern

Colorado, which is one vast lignite basin, containing stores of this truly precious mineral.

The southern mines embrace those of Trinidad and Fremont county, and furnish a class of mineral entirely different from any yet found in the Territory. The latter are the oldest mines and the best known, and the demand for it is great, not only for household use, but for the manufacture of gas in Denver.

The Summit county mines are not worked, as they have only lately been brought into notice. They are located on the divide between the Bear and White Rivers, and consist of several seams varying from five to fifteen feet in thickness, which owing to the contorted strata, lie in a variety of positions, from a strict horizontal to a perfect perpendicular. Above is a stratum of sandstone varying from one to three hundred feet in thickness. The coal is of two kinds, one a hard lignite and the other similar to what is called albertite.

The Conejos beds are also new discoveries of which but little is known. Sufficient outcroppings of coal, however, have been noticed below, and west of Las Animas or Elbert, to indicate the existence of extensive lignite deposits there. The mines are hardly opened yet, but situated as they are, not more than thirty miles south of the centre of the San Juan gold and silver district, it will be but a short time before their product will be called for, should they prove at all suitable for metallurgical purposes.

INDIANA.

The area of the Indiana coal measures approximates one fifth of the entire State, and embraces the counties of Perry, Spencer, Warwick, Posey, Vanderberg, Gibson, Pike, Dubois, Daviess, Knox, Martin, Sullivan, Greene, Clay, Vigo, Parke, Vermillion and Fountain. The most important coals, from a manufacturing point of view, are those known as the "lower block" 3.8 thick, the "main block" 4.4 thick, and "upper block" 1.10 thick. Block coal has a laminated structure, and is composed of alternate thin layers of vitreous dull black coal and fibrous mineral charcoal. It splits readily into sheets, breaking with difficulty in the opposite direction; on burning, it scarcely swells, or changes form, and never cakes or runs together. What the celebrated English chemist, Mushet, said about a certain Welsh coal, is equally applicable to the block coal of Indiana. To the purity of Splint coal it unites all the softness and combustibility of wood, and the effects produced by it in the blast furnace, either as to the quality or quantity of

iron, far exceed everything in the manufacture of that metal with charcoal. From careful assays, it is ascertained that this coal gives from 56 to 62 per cent. of fixed carbon, a small amount of water and a small amount of ash. Dr. E. T. Cox., the State geologist, gives this coal an exceptional character as an iron smelting fuel, and reports a ton of pig iron as being made with 4,250 pounds of block coal.

The coal in Clay County is favorably known as an iron-smelting fuel, and we append a description of its qualities. "There are two veins of coal, the upper vein averaging about three feet ten inches in thickness, and the lower one averaging about four feet. The roof is principally sand rock, slate, and slate and sand rock mixed. Fire and potters' clay of good quality underlie the coal. The average depth to the first vein is about forty five feet from the surface, and the second or lower vein is found at an average depth of seventy-five to eighty feet. The coal is free from slate and sulphur. It burns freely, and leaves a soft, fine white ash, similar to wood ash, and no clinkers." For domestic and steam purposes, the coal is largely used in Chicago, Ill; Indianapolis, Ind; Kalamazoo, Mich.; and the towns and stations along the lines of most of the railroads leading from this coal district, among which may be mentioned the St. Lou's, Vandalia, Terre Haute and Indianapolis Railroad; the Jeffersonville, Madison and Indianapolis Railroad; the Indianapolis and St. Louis Railroad; the Louisville, New Albany and Chicago Railroad; the Cincinnati, Lafayette and Chicago Railroad; the Lake Shore and Michigan Southern Railroad; the Indianapolis, Decatur and Springfield Railroad; and the Michigan Central Railroad.

In the block coal zone of the Indiana coal fields there are as many as eight seams of non-caking coal, four of which are of good workable thickness over a portion of the field. These are I, G, F and A, which together, have a maximum thickness of fifteen feet; and by including the other four seams, we have six feet more, making a total of twenty-one feet of block coal.

The coal of Parke County is favorably reported on for the manufacture of iron. It is a block coal, averaging five feet in thickness, weighing seventy-seven pounds to the cubic foot, and gives by analysis 62.5 fixed carbon, 31.00 volatile matter, 4.05 water, and 2 per cent. of ash. The estimated area is about 300 square miles of workable coal.

The "upper block" at Washington, in Daviess County, is extensively mined, and meets with a ready market at St. Louis, and all the towns on the Ohio and Mississippi Railroad. Its specific gravity is 1.294; a cubic foot weighs 80.87 pounds; by analysis it yields: fixed carbon, 60.00; ash, 4.50; volatile matter, 35.50. The coal worked is known as L, a five foot

seam of Bituminous, an excellent caking coal, free from impurities, and may be handled and stocked without much loss; it has been used for gas making at St. Louis, and is a three foot ten inch seam of very pure coal, jet black, of cubical fracture, and bears a good reputation as a fuel, for general uses.

All the coals of the Indiana field belong to the class known as bituminous. The principal varieties may be designated as follows:

Caking coal, long flame, gas and smith coal, fat coal.

Semi-caking coal, long flame.

Block coal, non-caking coal, long flame, dry burning coal, furnace coal.

Semi-block coal, long flame.

Cannel coal, long bright flame, dry burning, gas coal.

The Daviess county, cannel coal, at the base is firmly cemented to a bed of brilliant black caking coal totally unlike the former in chemical composition.

Prof. Cox remarks that this is the most remarkable seam of coal of which he has any knowledge, and when taken in connection with the Breckenridge coal, sets at defiance the theory that cannel is due to a flora distinct from that which, in general, furnished anthracite and bituminous coals. The Indiana cannel, like the Breckenridge of Kentucky, is rich in carbon oils and gas. It contains from 7 to 10½ per cent of very white ash, and is remarkably free from pyrites. The quantity of ash greatly exceeds what we find in the caking and block coals of Indiana, though less than is found in the Breckenridge coal. In every case the ash is in excess of what could be derived from any species of plants known to botanists and in a great measure must have been furnished by water, either turbid or holding in solution mineral matter. If by the latter, then its presence must have had a marked influence in determining the character of the chemical change from wood to coal.

The following analysis will serve to show the character of some of the Indiana coals.

	Fixed Carbon.	Vol. Matter.	Water.	Ash.
Fountain County	54.5	36.0	5.0	4.5
Vanderberg County.....	48.5	42.0	3.5	6.0
Warwick County	49.5	41.5	3.5	5.5
Posey County	51.0	39.5	4.0	5.5
Sullivan County.....	55.0	40.0	3.5	1.5
Daviess County	53.5	36.0	5.5	5.0
Vermilion County.....	46.0	44.0	5.5	4.5
Parke County.....	46.5	46.0	4.0	3.5
Montgomery County	52.0	41.5	3.0	3.5
Clay County	61.5	32.5	3.5	2.5
Owen County	57.5	38.5	2.0	2.0
Greene County.....	63.0	29.5	7.0	0.5

WEST VIRGINIA.

The coal measures of West Virginia underlay nearly sixteen thousand square miles of territory, of which, what is known is the Kanawha and New River Valleys hold eight thousand. Three varieties of coal occur: cannel, splint, and bituminous. Of the bituminous there are seams of different degrees of hardness and texture, from the friable coking coal, similar to the best of the Newcastle (England) coals, to the harder splint coals, with regular cleavage, similar to the Youghiogheny coals so largely in demand in our Western and Southern cities; of so compact a nature that it can be used in an iron blast furnace in its raw state.

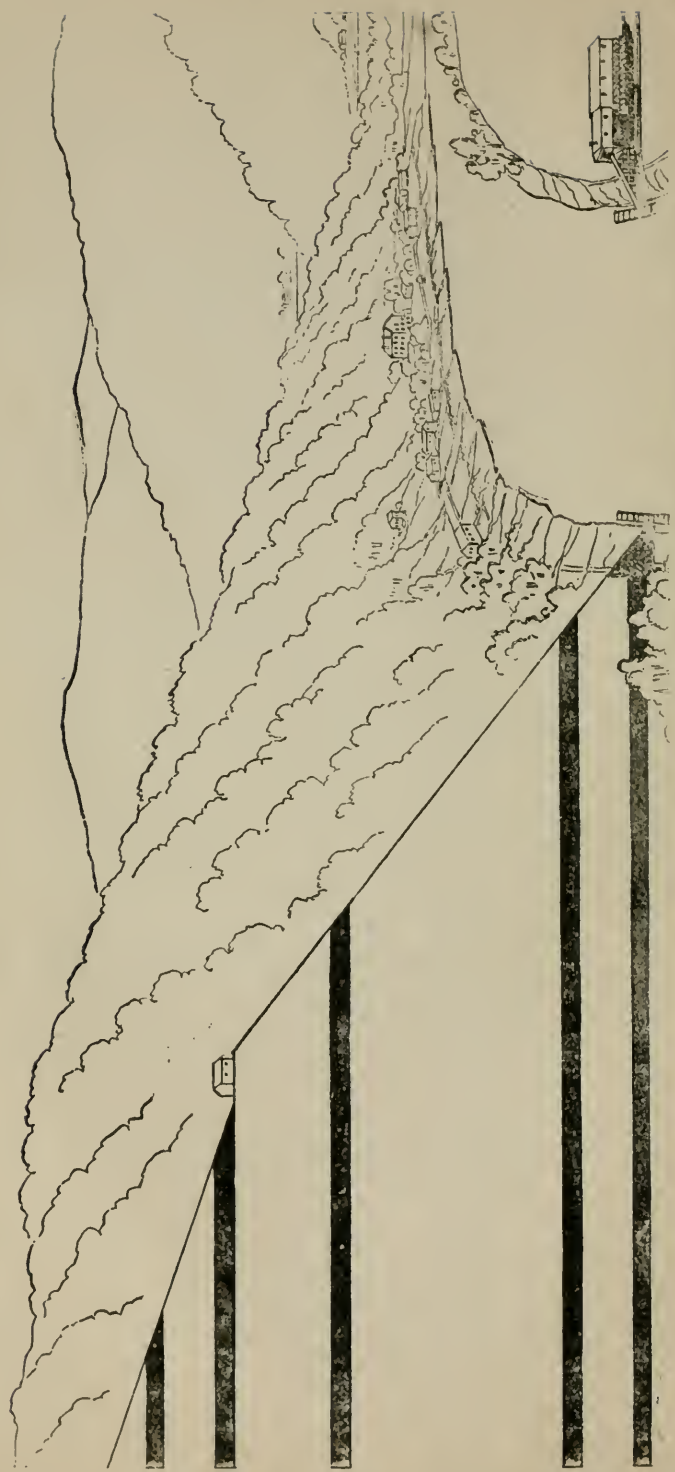
The bituminous coals are excellent steam raising fuels, and have been used in steamers, railways, and under stationary engines with good results. The gas coal seam is identical with the Kittanning coal bed, mined on the Allegheny river, in Pennsylvania, and has been used in the eastern and western markets with most satisfactory results.

On approaching from the eastward, the bituminous coal seams of West Virginia are first found in the tops of the mountain ranges overlooking New river, in Summers and Raleigh counties, embracing only the lowest seams of what are known as the lower coal measures. The Big Sewell mountain a prominent elevation in West Virginia, towering some 2,800 feet above sea level, and 1,500 feet above New river, forms the south eastern edge of the "Upper Ohio coal basin." All the territory drained by the Kanawha and its tributaries, between the Falls of the Kanawha and Campbell's creek, contains the seams of coal within workable reach, above water level, or by shafts at no great depth. It can be mined very cheaply; and the quantity available is vast beyond conception. The top seam of the lower coal measures disappears beneath the Kanawha, at its confluence with the Elk river, at Charleston; while some of the coal seams reappear up the valleys formed by the Elk and Coal Rivers. Cabin creek, Elk river, and Coal river are three considerable tributaries to the Kanawha, penetrating the country for long distances, and bringing into convenient working position thousands of acres of valuable coal land.

At Quinnimont, on the line of the Chesapeake and Ohio Railroad, 295 miles west of Richmond, are the works of the New River Car Co. Analysis made by J. B. Britton, gave the following results:

Coal.		Coke run of mines.	Coke from slack.
Fixed Carbon.....	75.89	Carbon.....	93.85
Volatile Matter.....	18.19	Ash.....	5.84
Ash.....	4.93	Sulphur.....	0.31
Moisture.....	0.74	Water.....	—
			2.71

This company is mining a vein about $3\frac{1}{4}$ feet bituminous coal, using the



General view of the country on the Kanawha River, at Cannelton, W. Va.

coke in their blast furnace, and for the manufacture of car wheels. The coke is fully equal to the famous Connellsville, of Pennsylvania.

At Nuttallburg, 316 miles west from Richmond, John Nuttall, Esq., is mining a Bituminous coal, from the lower coal measures; the vein is $3\frac{1}{2}$ feet thick, far above water level. The coal finds a market east and west for steam purposes. The slack is made into coke, and it has been used for iron smelting, and in foundries with great success, being pronounced by those who have tried it, equal to the best Connellsville.

At Hawk's Nest, 325 miles west from Richmond, are the works of the Gauley-Kanawha Co. This coal was analysed at the School of Mines, in London, with the following result: Carbon, 83.31; hydrogen, 5.54; oxygen and nitrogen, 6.86; sulphur, 0.74; ash, 2.15; water, 1.40.

At Cannelton, 344 miles west from Richmond, are the mines of the Cannelton Coal Company, the product of which is so well known in the eastern and western markets. In ascending order, from the river level, the following principal seams of coal are found. First, about twenty feet above the river, 4 ft. 6 in. of a superior quality of Bituminous coal; at 100 feet, is a seven feet seam of first class gas coal; at six hundred feet, is a seam of five feet of superior splint coal, unsurpassed as an iron-making fuel; at seven hundred feet, is a seam of $3\frac{1}{2}$ ft. Cannel, and $2\frac{1}{2}$ ft. Semi-Cannel. The former is the celebrated Cannelton Cannel; the Semi-Cannel somewhat resembles the Splint coal of seam number three, is very valuable for house use, and has been satisfactorily used for gas making.

About eight hundred feet above the river, and above the "Flint Ledge," is a seam of superior Block coal, six feet in thickness, of great value for steam and iron making. In addition there are several smaller seams, varying from twelve to thirty inches in thickness, located between seams number two and three.

An analysis of the Cannelton Cannel, made by the Manhattan Gas Light Co., of New York, gave—Volatile matter, 58.0; fixed carbon, 23.5; ash, 18.5. At standard (10,000 cubic feet) it gave an illuminating power of 64.54 candles, or 12.025 cubic feet of 45.60 candles. Weight of 32 bushels of coke, 1320 pounds.

In the vicinity of Coalburg (Brownston) 354 miles west from Richmond, are several operations, working coal which is highly appreciated by iron-masters as an excellent fuel, in its raw state, in the reduction of iron ores, and also for steam and domestic purposes in the markets reached by the Kanawha and Ohio rivers. Analyses made of the bituminous coal from this locality show: Fixed carbon 56.0 to 62.6; volatile matter, 40.5 to 33.3; ash, 1.5 to 1.8; water, 2.0 to 2.5.

At Peytona, in Boone county, are the mines of the Peytona Cannel Coal Co., located on Coal river, about thirty-five miles from its junction with the Great Kanawha river, 380 miles west from Richmond. The coal is transported by slackwater navigation to the mouth of Coal river, where it is transferred to the cars of the Chesapeake and Ohio R. R. The greater part of the product of the mines has been forwarded by the Kanawha and Ohio rivers to all of the important places bordering these rivers and their tributaries. The coal is also sold in the Eastern markets, where it is esteemed for gas purposes and as a grate fuel. We give place to an analysis of this coal made by the Manhattan Company. Volatile matter, 46.0; fixed carbon, 44.0; ash, 13.0. At 10,000 feet per ton, standard yield, the illuminating power is 43.12 candles, or 13,200 cubic feet of 32.66 candles. Weight of coke, 32 bushels=1380 pounds.

Many new company and individual enterprises are being located in this region, and all that we have said as to the resources of this section of the Union, is in a fair way of being recognized.

As to an outlet from this region we have the Chesapeake and Ohio Railway eastward, the building of which has done so much to open up this district. Their charges for carrying coal are extremely liberal, and now that a more decided movement seems to have been inaugurated, looking to the development of the coal trade, in time it is destined to carry to tide-water considerable quantities of coal; the figures for a term of years are given in the review of the trade of Richmond, Va. See also item upon the improvements of the Kanawha River, under "Interesting Facts and Figures."

MISSOURI.

The coal measures of Missouri comprise an area of about 22,995 square miles, including 160 square miles in St. Louis county, 80 in St. Charles, and a few outliers in Lincoln and Warren; the remainder in northwest and western Missouri. This includes 8,406 square miles of upper or barren measures, about 2,000 square miles of exposed middle, and 12,420 of lower measures. The boundary between the middle and lower coal is not well defined, but is limited by a thick-bedded, coarse, micaceous sandstone, sometimes of no great extent, at other times of great thickness. We suppose it to enter the State in the west part of Bates county, and to pass thence via Butler to Chilhomee in Johnson county; thence northwardly four miles west of Warrensburgh to four miles east of (?) Aulville, Lafayette county; thence, irregularly meandering through Lafayette county, crossing the Missouri river, passing to ten miles east of Carrollton, Carroll county; thence to the southeast corner of Livingston county, from which point it bears north-east to the centre of Linn county, and thence, northward. The southern

and eastern boundary of the lower coal measures is as follows: (through Barton, Bates, Vernon and St. Clair, the boundary has not yet been well defined;) entering the State in Barton, it passes northeast through the eastern part of Vernon; it enters St. Clair about one half way up, on its western line, thence, meanders eastward to a point a few miles north of Osceola; thence, northward to within eight miles of Clinton, Henry county, thence northeast to the east line of Henry county; thence northwardly, with occasional variations of sandstones as much as eight miles east to Brownsville, Saline county; thence north-eastward to Marshall and thence to Miami. On the north side of the river it passes eastward, from a point opposite Arrow Rock, to the east line of Howard county; and thence, in a meandering course via Columbia, Boone county, New Bloomfield and Fulton, Callaway county, to the northeast corner of Callaway; thence, north-eastwardly to a point three miles west of the northeast corner of Montgomery county; thence northwest to near the mouth of Lick creek, Ralls county: thence, southwest to Mexico, Audrain county; from thence, to the northwest corner of Monroe county, thence, irregularly trending northward to the northwest corner of Knox county; thence, to a point on the north line of Lewis county, about 12 miles west of the Mississippi river; thence northwardly to the Des Moines river, on the north line of the State of Missouri. East of this, are small outliers in Montgomery, Warren, Lincoln and St. Louis counties, and perhaps others in southwest Missouri.

The aggregate thickness of the upper coal measures is 1,317 feet, including only about 4 feet of coal, of which there are two seams of one foot in thickness; the others are very thin seams or mere streaks. The middle coal measures include a total thickness of about 324 feet, in which are embraced about 7 feet of coal, including two workable seams of 21 and 24 inches; one other of one foot, that is worked under favorable circumstances, and six seams too thin to work. The lower measures include from 250 to 300 feet, embracing about five workable seams of coal, varying in thickness from $1\frac{1}{2}$ to $4\frac{1}{2}$ feet, and thin seams varying from 6 to 11 inches, and several minor seams and streaks; in all 13 feet 6 inches of coal. We therefore have in Missouri nearly 1,900 feet of coal measures with a total aggregate of 24 feet 6 inches of coal. The thinner seams of coal are not often mined, except in localities remote from railroad transportation. The coal from thicker seams (those from $1\frac{1}{2}$ to 2 and 4 feet) is generally sold at 10 cents per bushel at the mines. The thin seam, 10 to 14 inches on Nodaway river, is sold at over 20 cents per bushel at the mines. The reason of this is the difficulty of mining (there being so much superfluous material to be removed) and the remoteness of other coals. Miners seem to prefer to work a bed of 2 to $2\frac{1}{2}$ feet in thickness. We would consider all beds over

18 inches thick as workable coals. The estimated area, where such may be reached within 200 feet from the surface, is about 7,000 square miles. The coal is bituminous, and the product may be safely estimated at 800,000 tons.

The following is a condensed vertical section of the coal measures:

No.	Locality.
1—339 feet, including 230 feet above the connected section.....	
2—12 inches coal.....	Holt, west part of Nodaway and northwardly ; also White Cloud, Kansas.
3—392 feet.....	
4—12 inches coal.....	Andrew, Buchanan, De Kalk, Gentry and Platte
5—2 7 feet.....	
6—10 inches coal.....	Platte county.
7—379 feet to base of upper coal measures.....	
8—3 inches coal at top of middle coal measures....	Pleasant Hill, Missouri City and Princeton Mercer County.
9—164 feet.....	
10—1 foot coal.....	Cass, Johnson, Lafayette and Livingston, also Grundy.
11—70 feet.....	
12—22 feet (Lexington coal).....	Lafayette, Johnson and Ray.
13—36 feet.....	
14—7 inches coal.....	Lafayette and Ray.
15—14 feet.....	
16—21 inches coal.....	Lafayette, Johnson, Carroll and Livingston.
17—50 to 90 feet.....	
18—1½ feet (Warrensburgh coal).....	Johnson, Henry and Charitan.
19—52 feet.....	
20—7 inches coal.....	Johnson.
21—18 feet.....	
22—1 foot 8 inches coal.....	Johnson.
23—18 feet.....	
24—8 inches coal.....	Johnson.
25—4 feet.....	
26—2 feet coal.....	Henry.
27—48 feet.....	
28—2½ feet to 4 feet 5 inches coal.....	Randolph, Boone, Callaway, Johnson, Henry, Vernon, Bates, Adair, Sullivan, Putnam, Audrain and Macon.
29—11 feet.....	Macon.
30—11 inches coal.....	Macon, Henry and Johnson.
31—About 13 feet.....	
32—2 feet coal ; 10 inches of clay near base.....	Ralls, Audrain, St. Louis, St. Charles and Montgomery, Henry and Johnson.

O H I O .

The coal measures within this State occupy a space of about 180 miles in length by 80 in breadth at the widest part, with an area of about 10,000 square miles, extending along the Ohio river from Trumbull county, on the north, to near the mouth of the Scioto, on the south. The counties wholly underlain with coal are Mahoning, Columbiana, Stark, Holmes, Tuscarawas, Carroll, Jefferson, Harrison, Belmont, Guernsey, Coshocton, Muskingum,

Perry, Noble, Morgan, Monroe, Washington, Athens, Miegs, Galla, Lawrence, and nearly all of Jackson. The counties of which the eastern or southeastern parts only are underlain with coal are Trumbull, Summit, Medina, Wayne, Licking, Fairfield, Hocking, Vinton, and Scioto. There are small detached basins in Wayne, Ashland, Richland and Knox counties. The boundary on the east is the State line, the same field extending eastward over all western Pennsylvania.

Prof. J. S. Newberry, divides the coals of Ohio into three classes—first, the dry, open-burning or furnace coals; second, cementing or coking coals; third, cannel coals, the first, which is popularly known as block coal, includes those that do not coke and adhere in the furnace, and are such as may be used in the raw state for the manufacture of iron. The second, embracing by far the greater portion, are of the ordinary coking, bituminous kinds, which to a greater or less degree melt and agglutinate by heat. The third variety consists of the cannel coals, which resemble a dark shale, highly impregnated with bitumen, and burns with a bright flame, but does not agglutinate.

The chief mining region of Ohio are the Mahoning Valley, the Tuscarawas Valley, the Hocking Valley, including the Straitsville and Shawnee mines, the Salineville region, the Pomeroy region, the Bellaire region, the Steubenville region, the Jackson region, the Cambridge region, the Coshocton region, the Leetonia region, and the Ironton region.

The mines of Mahoning Valley, the Tuscarawas Valley, and the Jackson region are all opened on the lower coal of the measures, called Briar Hill coal, Block coal, furnace coal, etc. It is usually about four feet thick. The mines of Hocking region, Steubenville, part of Salineville, Cambridge, are opened on No. 6, which ranges from 4 to 13 feet of thickness and is open burning in quality also. The others are worked in each of the different beds, of which there are ten altogether of minable thickness.

The chemical analysis of the Ohio coals shows that the relative amount of moisture varies from 1.10 per cent. to something over 9.10 per cent. The amount of volatile matter varies from 28 per cent to something over 40 per cent. Fixed carbon varied from 34.10 (in the upper coal from Holmes county) to 65.90 (in the coal from Steubenville shaft.) The ash found in eleven Ohio cannel coals was 12.827 per cent. The average proportion of sulphur was 1.551 per cent, that from the lower half of the State being 1.229 per cent. and that of the coal from the upper half 1.836 per cent.

Coal was discovered in Tallmadge, a mile west of the Centre, as early as 1816. It was visible in a small ravine, where for many years blacksmiths from the adjacent country came and dug it from an open pit. At that time no other coal was known in Northern Ohio. As early as 1755, mineral coal

had been discovered near Bolivar, in Tuscarawas county, by its being seen on fire, but it was not dug or mined for use as fuel, in this part of the State, prior to the year 1810. The seam was four feet thick, and was regularly mined in 1820.

The Perry county coal field is new, dating back only to 1870 ; yet there is more coal annually produced in this county, than in any other in the state. The coal is of the same character as the block coal of Mercer, Trumbull, Mahoning and other adjoining counties, is eleven feet thick ; there are two other veins, one under and one above the "great vein," aggregating another eleven feet making in all twenty-two feet of coal in three veins, in the same hill, all above the water level.

Regarding the coal resources of the State of Ohio, the Inspector of mines, Andrew Roy, reports that there are sixteen different seams of coal which exceed two feet in thickness. There are several other seams, but they are very thin, not exceeding two to six inches in height, and often of quite limited area. Thirteen or fourteen of the series are of workable thickness in many places of the coal field, but with the exception of No. 6, all the lower workable coals are subject to faults, or become so reduced in height as to be of little or no commercial value over large areas where they are due. Even No. 6, which, in many places in Perry, Jefferson, and Tuscarawas counties, rises to the magnificent height of eight or ten feet, dwarfs to two and one-half feet, then down to a mere trace, and sometimes disappears altogether. No. 8, the Pittsburgh seam, is remarkable alike for its continuity wherever it is due, and for its presence in workable height.

"Though there are numerous wants in the different coal beds of the State, there is a general continuity of the seams from outcrop to outcrop. The coals of the Mahoning valley and Massillon regions have their representatives in the Jackson and Lawrence districts. It is suggested that the wants or interruptions are the result of water spaces existing in the old coal plain at the time of the deposition of the coal vegetation, and also of denuding forces and the rolling or hilly character of the coal marsh. Where wants are met in any of the seams having level floors, the coal has been eroded by currents of water in rapid motion passing over the loosely matted peaty material, and cutting or washing channels through part or the whole thickness of the peat bog during the first stages of the subsidence of the coal. Sandstones, fire-clays, or shales, usually the former, are found usurping the place of the eroded coal where wants are found in any of the seams due to erosive agencies or to original water spaces. The floor of the coal beds is almost invariably wavy and rolling, the high arches or hills containing

barren ground. The coal is seen to become gradually thinner in ascending these hills, and finally to disappear altogether. This wavy character of the coal floors is more marked in the lower than in the upper coals of the series, and is most marked of all in the lowest seam, or Coal No. 1.

"The strata associated with the different beds of coal are composed of sheets of shales, sandstones, limestones, iron ores, and fire clays in alternating layers. None of these sheets, except the fire-clays forming the floor of the coal beds, are persistent like the coals, but appear and disappear at frequent intervals. The shales are replaced by sandstones, the sandstones by shales, the limestones change to pure or calcareous shale or sandstone, and the iron ores also become changed to other rocks. The first deposition of sedimentary material which formed over the coal after the subsidence of the coal marsh, was very generally mud (now shale), though sandstone, impregnated with the remains of the coal flora, showing that this was the first formation, is sometimes found forming the coal roof. Frequently a sandstone is met, but shale was the first deposition, and was subsequently removed. None of the sheets forming the coal strata are very thick. Masses of material, either sandstone or shale, several hundred feet in thickness, are met, but on close examination they are found to change in color and character, the alternating shales being black, blue, gray, etc., and the sandstones being light, red, buff, gray, etc.

The coal produced in 1872, was 5,315,294 tons; in 1873, 5,450,028 tons; in 1874, 3,267,585 tons; in 1875, 4,868,259 tons; and for 1876, Mr. Roy estimates the output at 3,500,000 tons.

TENNESSEE.

This is included in the great Appalachian coal-field of the United States, which extends from Pennsylvania to Alabama, and comprises 80,000 square miles, 60,000 of which will furnish available coal. Its area in Tennessee is 5,100 square miles, which area includes the whole of the Cumberland Table-land. This division of the State forms an irregular quadrilateral, having the northern and southern boundaries nearly parallel, the former being about 71 miles long, and the latter or southern boundary being about 50 miles in length. The other sides run diagonally through the State in a northeasterly and southwesterly direction. A central longitudinal line would bear about north 20° east.

Between the Mountain limestone and the top of the main conglomerate which forms the general surface of the Table-land, there is a series of strata composed of shales, sandstones, fire-clay and coal. The average thickness of this series, including the conglomerate rock, is about four hundred feet,

thinning out in some of the counties to two hundred feet or less. This series constitutes the Lower coal measures. There are three well defined seams of coal found in what is known as the Lower coal measures :

1. *The Slate Vein.*—This occurs from twenty to sixty feet above the Mountain limestone, and is called the *Slate Vein*, because overlying it is a bed of shale from fifteen to twenty feet thick. A rusty-colored shale often appears beneath. The coal in this seam is from one to three feet thick, and is very hard and lustrous.

2. *The Cliff Vein.*—This lies sixty to eighty feet above the Slate Vein, and is capped by a heavy sandstone, which forms a well defined cliff above the coal. This seam is from one to twelve feet thick ; coal hard and much like that of the Slate Vein.

3. *The Sub-conglomerate Vein.*—This is too thin to work at the outcrop, and is important only in showing its wonderful persistency. It is from six inches to two feet thick, affording excellent coal.

These three seams are the only beds of coal that are known to exist in the Lower coal measures. One other has been suspected, but there are reasons for believing that it is a drop from the Cliff Vein.

Superimposed upon the main or table-covering conglomerate are many billowy ridges composed of sandstone and shales, with several coal seams. In the region around Tracy City there are usually four of these seams, only one of which, the main Sewanee, may be considered valuable. At Coal Creek, in Anderson County, where the Upper coal measures reach a much greater thickness, the number of seams is greatly increased. According to Prof. Bradley, there are twenty-one seams at Coal Creek, eight of which are workable. The Seams in the Upper coal measures appear to be more uniform in thickness, but the coal usually has not the hardness, nor will it bear transportation so well as that of the Lower Measures. The principal seams are found in about the following order.

1. Twenty feet above the main conglomerate which divides the Upper from the Lower coal measures, the first seam is met with, which is usually from one to two feet thick, sometimes swelling out to a thickness of four feet, with thirty feet of shale above separating it from.

2. *The Main Sewanee.*—This varies in thickness, from two to seven feet, usually about four feet, and is capped by a bed of shale from fifteen to twenty feet thick. Sometimes the sandstone lies immediately above the coal. The quality of this coal is well known, on account of its having been mined more extensively than any other in the State. It is a very pure coal, bituminous, spumous, fragile with contorted laminae ; highly esteemed as a heat generator, being what is called a long-flamed coal. It makes ex-

cellent coke, which is used extensively in the manufacture of pig iron, and in rolling mills. The greatest and almost the only objection to the coal of this seam is its tendency to slack or to disintegrate upon exposure to the atmosphere. At a few of the outcrops of this seam, however, the coal is cubical and of great specific gravity, preserving the purity of the upper seams and the hardness of the lower. Such coal is found at Deakin's bank, in Sequatchee county, and at Kelly's bank, in Marion.

3d. and 4th. Two thin seams of coal 160 and 200 feet above the Main Sewanee. These seams are almost useless, the thickest showing only one foot of good coal.

To summarize: The coal-field is separated by the main conglomerate into the Upper and Lower coal measures. The Lower measures have three seams of coal, two of which are workable. The Upper Measures in the northeastern part of the coal-field have eight workable seams, and in the southern part only one, which is the Main Sewanee.

ARKANSAS.

The coal field of Arkansas has an area of 12,000 square miles, in twelve counties. The coal found is semi-bituminous or semi-anthracite. A bed of semi-bituminous coal nine feet thick is reported in Sebastian County. The Spadra semi-anthracite is the only coal that is known in market to any extent, and an account of its location, etc., will prove interesting. "This name is given to a deposit of semi-anthracite coal, three feet thick, found at Spadra, in Johnson County, 105 miles from Little Rock, now being worked by the Spadra Coal and Iron Company. It lies almost horizontal, with a slight dip to the north. It crops out on the river bank, and is traceable along the river front. On digging anywhere, the same vein, from $3\frac{1}{2}$ to 4 feet thick, is invariably struck within 55 feet of the level of the river front. The product is about 5,000 tons. The existence of a second vein, which is, as near as can be ascertained, about 30 feet below the one now working, is a matter of development. The coal can be placed at Little Rock at \$3.25 a ton; at the mouth of the Arkansas River, \$3.75 a ton; at New Orleans for \$5 a ton; at St. Louis, \$6.75 per ton."

The only coal to compete with on the lower Mississippi, from the mouth of the Arkansas to New Orleans, 600 miles—which section of country consumes about one million of tons per annum—is the Bituminous coal, principally furnished by Pittsburgh.

The mines of the Ouita Coal Co., producing an excellent variety of this semi-anthracite, are seventy-two miles from Little Rock; the vein is 32

inches thick. Analysis gave 80.46 fixed carbon; 12.66 volatile matter; ash, 5.11; water, 1.77; color of ash, light brown.

Professor Owen gives an analysis of the coal in the First Geological Report on Arkansas, page 130. It was also analysed by Mr. I. A. Liebig, and by L. C. Bierwirth, with the following results:

	OWEN.	LIEBIG.	BIERWIRTH.
Moisture.....	0.5	1,524	0.680
Volatile and combustible gases.....	7.9	7,527	10.521
Fixed Carbon.....	85.6	85.081	83.719
Ashes.....	6.0	5.468	5.080
Total.....	100.	100.	100.
Specific gravity.....	1.335	1.3408	1.3112

IOWA.

The coal industry of this State has made great progress during the last few years, especially in the county of Polk, which is situated centrally as regards the field. For the most part the demand and market has been purely local, but for the last two years an export trade of some value has sprung up and is still on the increase; northward into Minnesota and Wisconsin, southward into Kansas, and westward into Nebraska, etc., The chief customers are the various railroads which in such number traverse the State, and then again derive a considerable portion of their local freight from the coal industry.

In the year 1874 the last general Census of the State was taken, and the assessors were all supplied with printed forms of interrogatories, intended to elicit complete information regarding this important industry; but the result was not entirely satisfactory, as some coal companies appeared unwilling to give full data regarding their works, mines, development thereof, output, ruling prices, etc. However a close approximation was obtained, and from it we find that in the year '74, there was 372 "banks" or mines opened, and being worked, employing 2928 hands of all grades in their development, with a total output for the year of 1,231,547 tons, of an estimated value of \$2,600,140. Since that time, during the last two years, several new mines have been opened, and the number now being worked is probably over 400. Coal has also been discovered in other counties than those worked in '74, so that it is now found and worked in 26 out of the total of 100 counties in the State.

The yield for a series of years past (those in which Censuses were taken) has been as follows:

1862.....	36,074 tons.	1866.....	99,320 tons.
1864.....	66,663 tons.	1868.....	241,453 tons.
1874.....			1,231,547 tons.

And for the year 1876 at the same rate of increase as from 1868 to 1874, the output would not be less than 1,561,580 tons, which is probably under the mark.

The whole coal field is well intersected by railroads, giving access to every important point therein, and the Des Moines river bisects it longitudinally into two very nearly equal parts.

In the years '66, '67, '68, and '69, a Geological Survey of the State was made under the direction of Dr. Chas. A. White, State Geologist. The Survey though not exhaustive, gave very valuable results, and we hope it will soon be resumed to include all those portions of the State yet unexamined. The various geological series are all developed very uniformly, the common longitudinal axis or direction of *strike* being from N. W. to S. E., in fact in the same direction as the Des Moines, and Cedar rivers and others.

Commencing with the oldest geological series represented in the State, the Azoic, we find a very curious outcrop of Sioux Quartzite, occupying an area of some 20 sq. miles in the extreme northwestern corner of the State in Lyon's County. Following down the Big Sioux river, about 35 miles below the former, the cretaceous series appears and continues along that river with an average width of some 12 or 14 miles, to a point on the Missouri river, about 18 miles below the entrance of the Big Sioux. This series does not occur again in Iowa, except in small isolated tracts some ten in number, in counties of Cass, Montgomery, and Carroll, Greene and Guthrie, and its total area in the State amounts to some 850 sq. miles. Following down the Missouri, we meet the outcrop of the upper coal measures, in the southwest corner of Monona County, at a point about fifteen miles above the entrance of the Little Sioux river. These measures cover a triangular area in the southwest portion of the State, of about 9,400 square miles, bounded on the west by the Missouri river, south by the Missouri State line, and north by a line somewhat irregular, but running approximately in a S. E. direction, intersecting the southern boundary of the State, at a point in Appanoose County about eight miles west of the Chariton river.

In the Upper coal measures, comparatively few developments have been made. They comprised in 1874, in Adams County, 9 banks open, employing 21 hands, with a production for that year of 3,000 tons, valued at \$11,250. In Taylor County, lying immediately south of Adams, the number of banks open was 3, of hands employed 22, production, 1,160 tons, of a value of \$4,320. In Wayne County there were 9 banks open, employing 49 hands, producing 4,034 tons, of \$9,068 in value. These comprise almost all the mines working the upper coal measures in the year 1874, with the exception perhaps of a few in Lucas and Appanoose Counties,

which are both crossed by the division between the upper and middle coal measures, but the mines in which most probably belong to the next or middle coal measures. The middle and the lower coal measures constitute the next geological series or division to the east of the last described, and their most western outcrop is in Audubon County, at a point about 40 miles west of Exira. Thence the edge of outcrop runs in a direction (approximating N. by E. to the northwest corner of Webster County, thence east by south to a point a few miles east of Eldora in Hardin County, thence south to the centre of the south line of Marshall County, thence in a southeasterly direction parallel to the Des Moines river, to the north-east corner of Jefferson County, thence south to the south line of the state; this area comprising about 10,800 sq. miles the whole or parts of 26 counties, and constituting the true coal field of Iowa. The number of tons mined in 1874 in these measures was 1,223, 453, of a value of \$2,575,502; were from 351 mines or banks, employing a force of 2,836 hands.

North and east of the lower coal measures is the area covered by the subcarboniferous rocks and clays, with a frontage on the Mississippi of nearly 100 miles, and a total average of about 7,200 sq. miles. Next comes the Devonian area of about 8,860 sq. miles fronting for about 25 miles on the Mississippi. Next the much smaller area of the Upper Silurian, series, 4,320 sq. miles, followed by the Lower Silurian, occupying some 2,230 sq. miles in the north-east corner of the state, and a long narrow strip along the Mississippi giving a frontage of over 160 miles. The surface of Iowa may be subdivided geologically then as follows:

Cretaceous.....	850 square miles.	
Upper coal measures.....	9,400	"
Middle and lower coal measures.....	10,000	"
Subcarboniferous.....	7,200	"
Devonian.....	8,860	"
Upper Silurian.....	4,320	"
Lower Silurian.....	2,230	"
Azoic.....	20	"
Undetermined as yet.....	11,365	"
<hr/>		
Total area of Iowa.....	55,045	"

ALABAMA.

There are two distinct coal formations in Alabama, the Coosa being a continuation of the Cahaba; originally the Warrior and Cahaba were one and the same, but became separated by the Silurian strata being thrown up between them, and they now form two fields.

On the Selma, Rome and Dalton Railroad, at a point fifty-five miles from Selma, a branch railroad, runs to the openings on a coal seam, which averages from two feet six inches to four feet in thickness, it is very hard, Semi-bituminous, red ash, free burning, non-coking, and a good household fuel. Being above water level, no machinery for either hoisting or pumping is required.

The principal market for these coals is the city of Selma, for household use, high freights on the railroad preventing its reaching distant points. The true destination for this coal would be one of the Gulf ports, say Pensacola, distant from Montevallo 270 miles, to be sold as a steam coal for marine purposes; and when Southern railroads learn that it is to their interest to have cheap coal freights, it will be carried there.

At Celera, seven miles northeast of Montevallo, the Selma, Rome and Dalton Railroad is crossed by the South and North Railroad, a continuation of the Louisville and Nashville Railroad to Montgomery. On this road, seventeen miles north of Calera, the Cahaba coal field is again reached at Helena Station. Several companies are working the seam which is here, from two and a half to three feet; a good coking coal, mainly above water level.

Crossing the Cahaba River, we find we have passed over the coal basin, and the coal dips south. The coal is a coking coal of fair quality, not very free-burning, and averages from two feet six inches to three feet thick. The next seam that is opened is five feet in thickness, also above water level, and a most excellent coal for blacksmiths's use and for making coke, but is far too friable for either steamer or household use. This coal averages from four to five feet in thickness.

In the Warrior field developments have been made sufficient to show six workable seams of coal, many of which are coking, varying from two and a half feet to seven feet in thickness. The dip is slight compared with that of Cahaba, although the quality is not quite equal to some of the seams in the latter formation, most of the Warrior containing small bands of shale. One of the upper series has been struck, showing eight feet of coal, free from slate and a good coking coal.

Both the Cahaba and Warrior fields are crossed by the extension of the Louisville road from Nashville south to Montgomery and Mobile, and when the Cincinnati Southern, now in course of construction, shall be completed, the outlets for the new industry that has sprung up in this part of the south since the war, will be all that can be desired. At the point where the railroad intersects the Cahaba in its course through the valley formed by the synclinal position of the strata on either side, from fifteen to twenty

workable seams of coal are exposed, aggregating a total thickness of not less than sixty feet. This field is twelve miles broad from north to south, by forty miles in length, aggregating five hundred square miles. The Warrior coal field, which is the largest of the two, stretches nearly across the state, and extends north from Birmingham nearly to the Tennessee river. This field covers an area of over five thousand square miles. The beds escaped the greatest force of the upheaval that brought them to the surface, and are consequently much less inclined than those of the Cahaba, which lie at an angle, usually of about thirty-five degrees, while the former seldom reaches twenty.

Component Parts by Analysis.	Cahaba Level Bed.	Cahaba Mulberry Creek.	Cahaba.	Warrior. Southern End.
Volatile matter.....	35.51	36.68	34.49	40.60
Fixed Carbon.....	57.42	57.23	60.09	54.07
Ashes.....	6.31	5.30	4.32	3.09
Moisture.....	.76	.79	.93	1.18
Sulphur.....	Trace	Trace	.17	1.06

ILLINOIS.

The valuable features of the coal found in this State are, that there is plenty of it, that it is very widely distributed over the State, and readily accessible. Although it is generally necessary to mine it by means of shafts, the coal is reached at so reasonable a depth from the surface that its mining is done without unusual expense; the number of railroads traversing all parts of the State with good level grades and without curves, furnish an abundance of cheap transportation, and there is a large market for the coal that is produced.

The valuable iron-smelting Big Muddy coal, found in the southern part of the State, and extensively used at St. Louis, as well as some of a fair quality in other localities, would lead us to the hope of yet finding coal of a better quality than much of that which is now mined. See the details of trade at St. Louis, for the tonnage of this coal received there.

The United States census of 1870 reports the production of coal in Illinois at 2 629,563 tons. To those accustomed to the large production of Eastern mines near our seaboard, these figures may appear small, but it should be considered that the coal business in the West is yet in its infancy. In La Salle County there are three seams of coal, the upper four and a half to five feet thick, the middle usually six feet, and the lower four feet. The most popular in the market is the middle, as it makes a dense fire, and is largely used for steam and domestic uses. In 1870 the product was 173,864

tons, according to the census reports, and this has probably been doubled by this time. What is known as Wilmington coal is found in Will and Livingston Counties; this is the cheap steam coal of Chicago, it is mined at and near Braidwood, some 53 miles south of Chicago, on the Chicago and Alton railroad, the seam averaging three feet in thickness. The amount in 1875 was 512,800 tons, and 510,533 tons in 1876. It makes a good steam coal, and is much liked for locomotive use. We append details of the business of the principal companies:—

Company.	Tons mined	Tons mined	Men
	1875.	1876.	Employed.
Wilmington and Vermillion Co.....	225,879	242,445	805
Eureka Coal Co.....	131,615	125,000	410
Wilmington Star Mining Co.....	117,680	79,630	265
Wilmington Coal Mining & Mt. Co....	37,626	51,458	120
Braidwood Coal Co.....	— —	12,000	65
Totals	512,800	510,533	1,665

St. Louis, Missouri, obtains a large supply of Bituminous coal from the Belleville district, in St. Clair County, Illinois. This county contains 450 square miles of coal, and the last census returns show a production in this county of 793,810 tons. The principal seam worked is from five to seven feet in thickness, and is economically mined. Analysis of this coal shows: Water, 6; volatile matter, 33.8; fixed carbon, 55.2; ash, 5.

In Vermillion County the seam is six feet thick, furnishing a good fat, soft caking coal. The vein is from seventy to one hundred feet below the surface. Mining was begun in 1867. The annual product is 250,000 tons.

In Williamson County, has been found a seam of nine feet in thickness which does not appear in the reports of the Geological Survey of this State; it is being made into coke for use at the furnaces at Grand Tower; analysis of the coke, showed fixed carbon, 85.79; volatile matter, 2.42; moisture, 2.48; and ash, 8.31.

KENTUCKY.

This State is mineralogically endowed with two distinct coal fields. The coal of Illinois enters the State near Hawesville, and occupies nearly the whole of twelve counties in the the northwestern portion of the State. The Appalachian coal crosses the Ohio river, a little above Portsmouth, and fills up nearly the whole of the eastern twenty counties.

The Kentucky river has its headwaters altogether among the coal bearing rocks. A section made from Red river in Wolfe county to the mouth of Troublesome creek in Breathitt county establishes the fact that five good

veins of coal exist. The indications are that the coal measures thicken, and the number of workable coals increase south-easterly from the mouth of Troublesome Creek. Canuel coal of excellent quality is found over an extended area of country bordering upon the stream and its tributaries. In addition to the numerous workable coals above the conglomerate sandstone in this region, there are two seams below, that are of workable thickness and of good quality.

Prof. D. D. Owen, before his demise, made a mineralogical and geological survey of the State, but the work was not completed. A large portion of the eastern coal-field was unfinished. Since the suspension of the survey new discoveries have been made—new coals opened and brought into market. Approaching the southeastern counties, by the Cumberland Gap branch of the Louisville and Nashville Railroad in the county of Rock Castle, we first encounter the sub-carboniferous limestone, which is the floor of the coal measures of the State. The limestone series are here three hundred and fifty feet thick, composed of an underlying sandstone—some few feet of colored shales, white marble beds, cherty beds, and encrinural limestone. Upon this member of the group reposes the coal conglomerate, frequently eighty and ninety feet thick. Ten miles from Mount Vernon, the country-seat of Rock Castle County, the coal measures of the three hills where the coal is opened rests immediately upon the limestone without the intervention of the conglomerate. There are two veins of coals in the hills. The lower one, at an elevation of fifty feet above the railroad, is too impure to be of any commercial value. The upper coal, about fifty feet beneath the summit of the hills, is being worked to advantage. The upper coal is three feet thick, and has the usual appearance of a good, dry-burning bituminous coal.

The coal field west of the Louisville and Nashville Railroad was first developed during the year 1872. In form this coal field is somewhat basin like; that is, the beds incline from the margin towards the centre. It underlies either in whole, or in part the counties of Christian, Butler, Hopkins, Muhlenburg, Hart, Grayson, McLean, Webster, Union, Henderson, Davies, Ohio, Hancock and Breckenridge, or a total area of nearly four thousand square miles for this coal field. Twelve beds of coal have been identified in the measures, but the results of the survey point to eight as the number of beds that will prove sufficiently trustworthy to receive final numbers. The markets for the coal are Nashville Tenn., and points on line of railroad from Evansville, Ind., to Nashville, Tenn. There are twelve veins of coal, ranging from two feet to eight feet in thickness. For steam purposes the coal rates at 99, Pittsburgh coal being a hundred. For gas

purposes four feet to the pound is obtained, but there is more sulphur than in Pittsburgh coal.

We append an analysis of the celebrated Breckenridge cannel coal ; volatile matter, 54.40 ; fixed carbon, 32.00 ; ash, 12.30 ; moisture, 1.30.

It is an error to suppose that the coal of Kentucky contains a greater percentage of sulphur than the coals of neighboring regions. In Indiana and Illinois certain coal beds have won a higher reputation than has hitherto been accorded the Kentucky coals, but later investigations have developed the fact that here, too, are exceptionally good beds, unexcelled, perhaps, by the most famous of those States. They have hitherto escaped general notice from the fact that they do not lie in what has been the district of active mining operations, although within convenient reach of transportation facilities. The following shows the total production of coal in the Western Kentucky coal field, for 1876.

Mines on St. Louis and Southeastern Railroad.....	113,000 tons.
Mines on Paducah and Elizabethtown R R.....	146,000 tons.
Mines on Green River.....	60,000 tons.
Mines on Ohio River.....	96,000 tons.

Making the grand total of.....415,000 tons.

The Louisville and Nashville road carried 40,000 tons out of the Eastern coal field. There is also a large amount sent out from this portion of the coalfield, via the Cumberland River, Kentucky River, and from Boyd and Lawrence counties, on the Ohio River ; so that the total amount from the State may be safely estimated at 700,000 tons for the year.

COAL PRODUCTION OF THE GLOBE, 1870 TO 1875.

Prepared for this Work by James Macfarlane, Author of "The Coal Regions of America."

	Square miles of	1870.	1871.	1872.	1873.	1874.	1875.
Great Britain.....	11,900	110,431,192	117,352,028	123,497,316	127,016,747	125,067,916	133,304,485
United States.....	192,000	32,863,630	41,000,000	45,000,000	50,512,000	47,872,963	49,634,652
Germany.....	1,770	23,316,238	37,852,463	42,324,466	40,335,741	41,655,332	42,283,097
France.....	2,086	6,550,000	13,400,000	15,899,005	17,500,000	17,059,547	16,949,031
Belgium.....	510	13,697,118	13,733,176	15,158,948	15,778,401	14,669,029	15,011,311
Austria.....	1,800	6,443,575	9,891,350	10,389,952	10,500,000	11,000,000	10,895,000
Russia.....	30,000	817,008	829,722	1,097,832	1,123,940	1,343,568	1,750,000
Spain.....	3,501	414,482	500,000	570,000	589,707	600,000	560,000
Portugal.....	.....	.....	.....	18,000	18,000	18,000	.....
Nova Scotia.....	18,000	625,769	673,242	880,950	1,051,567	872,720	781,165
Australia.. ..	24,840	808,564	915,784	1,040,154	1,226,475	1,304,567	1,450,000
India.....	2,004	500,000	500,000	600,000	850,000	850,000	850,000
Japan.....	5,000	.....	.....	84,000	150,000	390,000	325,500
Vancouver's Island.....	390	29,863	45,000	75,000	75,000	81,397	113,000
*Other Countries.....	.....	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
.....	.....	197,557,499	247,692,764	258,141,623	267,737,179	262,785,029	274,967,241

* Italy, New Zealand, Chili, China, etc.

 THE GERMAN EMPIRE.

This country, as now consolidated, ranks as the largest producer of coal in Europe.

The production of coal and Brown coal in Prussia for a series of years.

Years.	Tons.	Years.	Tons.
1837.....	1,950,915	1867.....	23,738,327
1857.....	9,841,220	1868.....	25,704,758
1858.....	10,721,323	1869.....	26,774,368
1860.....	12,347,828	1870.....	23,316,238
1861.....	14,138,048	1871.....	32,843,288
1862.....	15,576,278	1872.....	36,973,411
1863.....	16,906,707	1873.....	40,335,741
1864.....	19,408,982	1874.....	40,685,332
1865.....	21,794,705	1875.....	41,759,558
1866.....	21,629,746	1876.....	43,364,968

Since 1870, the Empire includes old Prussia, Saxony, Bavaria, and the States of the Zollverein.

The product of coal of all kinds in the whole of the German States, now amounts to something nearly fifty million tons annually, placing this country well up in the rank of coal producers of the globe. The grand total of the output in 1871, when the consolidation of the empire was completed, was 37,852,464 tons; in 1872, 42,324,466 tons, of 2240 lbs. each; we have no returns from the individual states later than this year, but we may safely put them down for five million tons annually. There is sent out from the Empire some four million tons of coal and coke, while the receipts from surrounding countries are two million tons; the number of square miles of coal area, in the Empire, is set down at one thousand seven hundred and seventy, this for the entire country, as now consolidated.

The great extension given to the metal and textile industries of Westphalia, and the Lower Rhine, is chiefly due to the proximity of coal. The Upper Silesian coal nourishes the extensive productions of iron and zinc carried on in that province. In Lower Silesia and Saxony, the mining industry is but slightly developed and the coal of these districts is almost entirely used in the working of spinning mills and weaving establishments. The Saar coal is partly exported to France for Railway purposes. Westphalia chiefly produces caking coal; the Upper Silesian coal contains a large proportion of hydrogen, and is therefore, principally used for gas. The proportion produced by each district may be stated as follows: Westphalia or Ruhr, 47½ per cent.; Silesian coal, 30 per cent.; Saxon coal, 11 per cent.; Saar, 11½ per cent.

COAL CUTTING BY MACHINERY.

We give a description of the Gillett and Copley machine, as we learn it is the most popular, in Great Britain, where this subject has attracted such a large share of attention. This machine is adapted for any seam of 24 in. and upwards, and can arrange its cutters at any level, as the circumstance of the seam may require, and is self-acting. It is made principally of steel and wrought iron; the frame is of angle iron, about 5 ft. 4 in. long by 2 ft. 4 in. wide, on which are fixed two cylinders $7\frac{1}{4}$ in. diameter, with a 9-in. stroke, working on to a crank shaft, which by a simple contrivance drives the pinion, which gears into the slots of the cutter wheel. The wheel is of cast steel, 3 ft. 10 in. diameter, and makes six revolutions per minute; on its outer edge are fixed 26 cutters, thus giving 120 strokes per minute, making an under-cut of 3 ft. 4 in. by $2\frac{1}{2}$ to 3 in. thick; the cutters are 4 in. long by $\frac{3}{4}$ in. square. Its self-acting or propelling arrangements are by a wire rope passing round a snatch-block fixed at one end of the face to be holed, and working round a small drum fixed at the front end of the machine, which is actuated by a ratchet wheel and lever worked by an adjustable crank. The top of the machine is covered by a plate of sheet iron to prevent the roof from falling among the working parts. A fair average work with this machine is reported to be about 25 to 30 yards long by 2 ft. 4 in. wide, with a pressure of air of 27 lbs. In one economic aspect this cutter is doing good service—in producing a large proportion of round coal. Out of every 100 tons of hand-hewed coal, 3 ft. 4 in. thick, 50 tons only of round coal are produced, the remainder being small, while the quantity produced by the cutter gives seventy-five tons of round to 25 tons of small.

IMPROVEMENTS ON THE KANAWHA.

The government improvements of the navigation of the Kanawha river, by dams and locks, now under way, will tend to develop the resources of this most wonderful region, and it will not be surprising to find this region in a few years the iron making district of America. Ten locks and dams will furnish slack water navigation from the Ohio river to Cannelton, a distance of 85 miles, the cost of which will be about \$250,000 for each dam with lock. Of these ten, there will be three above and seven below Charleston. These locks and dams are being constructed of hewn stone, and in the most workmanlike manner. In nine of the dams, however, there is to be an 'open pass,' two hundred and fifty feet in length. In this 'open pass,' there is to be a wooden and iron structure, so arranged that it can be elevated in low water, and thereby furnish seven feet of water in the shallowest places, in the river, and can be lowered during high water, and thereby furnish free and unobstructed navigation during the rises in the river. Hence, these dams are called 'movable dams.' The first nine dams from the Ohio river are to be movable dams, which will furnish seven feet of water from Paint creek to the Ohio river during low water, and an open river during high water. The locations and lifts of the dams will be as follows: At or near the mouth of the Kanawha, 8 feet lift, at or near Debby's Ripple, 7 feet lift; at or near Gillespie's Ripple, 6 feet lift; at or near Red House Shoals, $6\frac{1}{2}$ feet lift; at or near Johnson's Shoals, 7 feet lift; at or near Newcomer's Shoals, $6\frac{1}{2}$ feet lift; at or near Island Shoals, 7 feet lift; at Brownstown, 7 feet lift; at Cabin Creek, 7 feet lift; at or near Paint Creek, 15 feet lift; total 'lifts' 77 feet, in a distance of 85 miles.

PETROLEUM PRODUCTION.

Stonells Petroleum Reporter, furnishes the following statistics of the Petroleum business for the year 1876:

New wells completed in the year.....	2,290
Daily average product of new wells.....	12½ barrels.
Number of producing wells at the end of December	6,000
Daily average production of all wells.....	5 6-10 barrels.
Production for the year, 8,968,906 barrels. Stock on hand at end of year, 2,551,199 barrels. Being a decrease as compared with a year previous, of 999,108 barrels.	
The destination of the product, was as below :	
New York.....	24.5 per ct.
Cleveland.	22.5 per ct.
Pittsburgh	19.1 per ct.
Creek Refiners.....	14 per ct.
Philadelphia.....	8.7 per ct.
Ohio River refiners.....	3.2 per ct.
Consumed by fire.....	2.5 per ct.
Baltimore.....	2.1 per ct.
Boston	1.8 per ct.
Local points	1.6 per ct.

COAL IN BRAZIL.

Recent researches prove the existence of coal in some of the provinces of Brazil. The Candiota and Arroio dos Ratos Mines, in the province of San Pedro do Rio Grande do Sul, are considered the most important. The former was granted to an English company, which is about to construct a line of railway for conveying the coal. The latter is also in the hands of an English company, which has its railroad already built, and supplies the steamers on Lake dos Patos and on some of the rivers. Concessions have been granted for working other valuable deposits, and it is hoped that in a few years this great element of industry and civilization will help to increase the prosperity of the Empire. Of Lignites, there are abundant deposits in most of the provinces, and mining grants have lately been made for working some of them. The Bituminous Schists are also not uncommon, but the best known and richest deposits are on the southern coast of the province of Bahia. The owners of some of the concessions are working petroleum on a large scale.

MODES OF WORKING ADOPTED IN THE COAL MINES OF GREAT BRITAIN.

BANKS AND STRAIT WORK, BORD AND PILLAR, WITH LONGWALL.—Yorkshire.

BORD AND PILLAR.—Northumberland, North Durham, Cumberland, South Durham, North Staffordshire, Cheshire and Shropshire.

BORD AND PILLAR AND LONGWALL.—East and West Scotland.

LONGWALL.—Derbyshire, Nottinghamshire, Leicestershire, Warwickshire, South Staffordshire,* Worcestershire.

SPECIES OF BORD AND PILLAR.—North, East and West Lancashire, South Wales.

STRAIT AND STALLS.—Monmouthshire, Gloucestershire, Somersetshire, Devonshire, South Wales.

* Special method of working ten yard seam.

CHESAPEAKE AND OHIO CANAL.

The Chesapeake and Ohio Canal is 191 miles in length, extending from Cumberland, Md., to Alexandria, Va.; and 184 miles from the same point to Georgetown, D. C. It is the outlet for large quantities of the celebrated George's Creek Cumberland Coal. The canal was in order for business in the year 1850. West Virginia Gas Coal is also carried to market by this route, received at Cumberland. The boats carry about 110 tons, and take from four to five days to make the trip. Steam has been used on this canal, as a substitute for horse power, with great success.

THE SPONTANEOUS COMBUSTION OF COAL.

The British Royal Commission report on this subject, that spontaneous ignition of coal, when due to the oxidation of the porous and readily oxidizable carbonaceous substances occurring in coal, does not appear to be favored by the presence of water in the coal, or by its access to a cargo; on the contrary, these portions, by becoming wet, would have their pores more proportionately diminished; hence the presence of water must be antagonistic to the oxidizing action of the latter in many instances, though, when iron pyrites is present, it may promote or accelerate spontaneous heating, as already pointed out.

The gases which are confined in a more or less condensed condition, in coal, vary considerably in quantity and composition in different kinds of coal; and they also gradually undergo various changes in composition by exposure, or keeping of the coal.

Their chief inflammable constituent is marsh gas, and it is to the admixture of this gas with a considerable volume of air, that explosions are due in freights or stores. In pits where explosions are liable to occur, the gas escapes either with more or less rapidity and force from fissures ("blowers"), or gradually from the freshly exposed surfaces of coal seams. When coal from such pits is brought to the surface, it continues slowly to evolve inflammable gas for some time afterwards, especially if the coal be in large masses, or stored in compact heaps.

If facility is not afforded for the ready escape, or removal into the open air, of the inflammable gas emitted from the coal, composing a cargo or contained in bunkers, on board ship, the spaces between the masses of coal, or any partially confined space not occupied by the coal, but in close proximity to, or communicating with it, will, in time, become filled with a mixture of gas with the air in those spaces, which, unless the former be present in very small proportions, would explode on the approach of a flame to it, and with a violence depending upon the proportion which the air bears to the inflammable gas which has become diffused through it.

As the application of flame (or of a body raised to a high red heat) is indispensable to the ignition of mixtures of air with the inflammable gas evolved from coal, it is obvious that explosion cannot occur spontaneously from this cause on board ship, but must be brought about by the accidental or incautious approach of a light to localities where the coal is stored, or where the explosive mixture is likely to penetrate.

If coal, from seams which are charged with marsh gas, is placed on board ship shortly after being raised from the pit, there is obviously great liability to the formation of an explosive atmosphere in the hold or bunkers, or spaces communicating with them, and every possible means should in such cases be had recourse to for facilitating the escape of gas from the coal into the open air.

But, as the gas requires a large admixture of air to render it violently explosive, it is obvious that any attempt to ventilate the coal by passing or drawing air into the body of the freight would be most likely to favor the production of a violently explosive mixture of gas and air. The only useful application which can be made of any special means of ventilation with a view to diminish the risk of explosion, would be to pass a current of air over the coal and immediately into the open air, so as to accelerate the escape and removal of the inflammable gas.

Mr. Henry Scott, of Newcastle, England, has proposed the following scheme for the prevention of the combustion of coal cargoes, by which, he has in three different instances, saved his ship. He remarks that long experience and careful observation have shown, that the first heating invariably takes place under, and in the vicinity of the hatches, and under the main hatch the first indication of increasing heat will always be found, as the largest amount of small and dust coal accumulates in that part, and often sparkling with pulverized pyrites. Mr. Scott suggests that the master, before sailing, should provide himself with three or four bars of round $\frac{5}{8}$ inch or $\frac{3}{4}$ inch iron, pointed at one end; also, some rough boards, seven or eight inches broad, one and one-fourth inches thick, a few small-sized studdingsail boom spars, and a few pounds of suitable nails, extra to his sea stock. With these and a little energy, he is fully armed against a merciless enemy. The iron rods are easily thrust down into the cargo in any direction, and once or twice a week drawing them out, and feeling them with the hand, he will detect heating, increase of heat, and the whereabouts of the hottest part; and this, he repeats, will invariably be found under the main hatchway, or near the center. He finds the heat increasing to a dangerous point; no time must be lost; have four of his rough spars, as above mentioned, roughly squared, and with these four-corned uprights, and his boards, nail together a square trunk about fifteen or sixteen feet in length, or, according to his depth of hold, three feet in diameter at one end, and four and one-half feet at the other; then cut it in two for handiness dig down in the hatchway over the hottest part, and insert the large end of the larger section in the hole, knock a few boards off one side, and let a man go inside and dig away the coals from under the cone, and pass them out, while others force it down by slightly ramming the corner uprights; when it gets down about six feet, it will require little forcing, and if the ship is rolling a little, it will creep down itself as fast as the coals are removed from under it, owing to its pyramidal form and the creeping pressure on its sides; when down its whole length, place the upper section on the lower one, and connect them by nailing battens inside, and sink the whole cone wright down to the keelson, sending the coals up in buckets with a whip. Mr. Scott states that he has never been more than eight hours in getting a trunk down in a ship of twenty feet hold. When the crew have cut through the heart of the central nucleus of hot coal, and removed twenty superficial feet from top to bottom, let them then split out with an adze each alternate board all around in the heated locality, leaving the trunk in that part like a cargo, through the openings of which free out the hot, small, and dust coal, sending it up as before for jettison; and, lastly, rig a large windsail, and tie the foot of it round the top of the trunk, and the danger is past. In twenty-four hours he will find all cooled down, and he may go on his way rejoicing.

AIR IN MINES.

It is found that the temperature of the earth increased with the depth of about one degree Fah. for every fifty feet to sixty feet. At the deep coal pit at Dunkinfield, the

temperature was constantly 75° Fah. at a depth of 2151 feet, and at a depth of 17 feet it was only 1° Fah., which gave an increase of 1° Fah. for every 89 feet only. The average degree of temperature of the earth was 1° Fah. for every 55 feet in descent to a depth of 1800 feet, and afterward 1° Fah. for every 44 feet. At 10,000 feet the temperature would be 212° Fah. provided all other circumstances remained the same; at 20 miles, 1760° Fah., and at 50 miles it would be 4600° Fah., heat sufficient to melt any known metal. Thus the deeper the shafts of their coal mines the greater the amount of natural ventilation they would obtain. A current of air travelling at a speed of 10 feet per second gave a pressure of 492 lbs. to the square foot; at 16 feet=989; at 21.34=6.027, and at 200=39.2, as experienced on the surface of the earth. These might be described as first, a breeze; second, a light gale; third, a gale, and fourth a hurricane. Increased velocity of wind meant greater friction or higher water gauge. Air was perfectly elastic; by pressure it could be squeezed into less bulk, and if that pressure were withdrawn it filled the same space as formerly. Heat had the same effect upon it as pressure. A cubic foot of air weighed 523 grains; a cubic foot of water weighed 1000 ounces; a cubic foot of watery vapor weighed only 272 grains. So that the more vapor there was in the air, the lighter it would be. Friction was estimated by the force required to overcome it. Friction of air increased or decreased in the same proportion that the extent of the rubbing surface exposed to the air increased or decreased. A circular airway offered less resistance in proportion to its area than the perimeter of any other figure. Airways should be as large and with as smooth a surface as possible. Splitting the air current was preferable to taking the whole current of air round the workings in one body. Generally speaking, splitting the air increased the quantity of air obtained by a given expenditure of power, but the benefits to be derived from splitting were limited by the area of the shaft.—*F. W. Wardle, Berslem, England.*

AMERICAN IRON TRADE.

From statistics of the American Iron and Steel Association.

	1873.	1874.	1875.
PIG IRON. —Anthracite.....	1,312,754	1,202,144	908,046
Charcoal.....	577,620	576,557	410,990
Bituminous coal and coke.....	977,904	910,712	947,545
RAILS of all kinds.....	890,077	729,413	792,512
Bar, Angle, Rod, Bolt, etc.....	705,964	687,650	668,755
Plate and Sheet.....	169,169	176,888	192,769
Cut Nails and Spikes.....	201,235	245,609	236,343
BESSEMER Steel Rails made.....	129,015	144,944	290,863
Steel, other than Bessemer.....	52,000	49,681	61,058
Stock of pig iron in first hands at end of year.....	.....	795,784	760,908

COAL TRADE OF THE UNION.

We give below the tonnage for the year 1869, as per census reports made in 1870, together with figures for year 1876, where available, in other cases we have made a careful estimate based upon our reports of the trade in the various States—we have added 3,000,000 tons to the Anthracite of Pennsylvania, as for local consumption and unreported business.

	1869—tons.	1876—tons.
Pennsylvania—Anthracite.....	15,610,275	21,436,667
—Bituminous.....	7,798,517	11,500,000
Illinois.....	2,629,563	3,500,000
Ohio.....	2,527,285	3,500,000
Maryland.....	1,819,824	1,835,081
Missouri.....	621,930	900,000
West Virginia.....	608,878	800,000
Indiana.....	437,870	950,000
Iowa.....	263,487	1,500,000
Kentucky.....	150,582	650,000
Tennessee.....	133,418	550,000
Virginia.....	61,803	90,000
Kansas.....	32,938	125,000
Oregon.....	.....	200,000
Michigan.....	21,150	30,000
California.....	.....	600,000
Rhode Island.....	14,000	14,000
Alabama.....	11,000	100,000
Nebraska.....	1,425	30,000
Wyoming.....	50,000	500,000
Washington.....	17,844	100,000
Utah.....	5,800	45,000
Colorado.....	4,500	250,000
Total.....	32,860,690	49,005,748

COAL FIELDS OF THE UNITED STATES OF AMERICA.

New England basin.....	500 square miles.
Pennsylvania Anthracite.....	472 square miles.
Appalachian basin—Pennsylvania section.....	12,302 square miles.
Maryland section.....	550 square miles.
West Virginia section.....	16,000 square miles.
Ohio section.....	10,000 square miles.
East Kentucky section.....	8,983 square miles.
Tennessee.....	5,100 square miles.
Alabama.....	5,330 square miles.
Michigan basin.....	6,700 square miles.
Illinois basin—Illinois section.....	36,800 square miles.
Indiana section.....	6,450 square miles.
West Kentucky section.....	3,888 square miles.
Missouri basin.....	26,887 square miles.
Texas basin.....	4,500 square miles.
Iowa.....	18,000 square miles.
Nebraska.....	3,000 square miles.
Kansas.....	17,000 square miles.
Arkansas.....	9,043 square miles.
Virginia.....	185 square miles.
North Carolina.....	310 square miles.

The total area is 192,000 square miles. The whole production of coal, according to the census reports for 1869-70, was 32,860,690 tons.

THE RAILWAYS OF THE WORLD.

The figures given below are to the end of 1875, with the exception of the United States, which is for one year later.

EUROPE.		MILES.	SOUTH AMERICA.		MILES
Germany.....		17,372	Venezuela.....		8
Austria.....		10,792	British Guiana.....		60
Great Britain.....		16,699	Brazil.....		831
France.....		13,414	Argentine Republic.....		987
Belgium.....		2,167	Uruguay.....		190
Holland.....		1,011	Paraguay.....		45
Luxembourg.....		166	Chili.....		618
Switzerland.....		1,293	Peru.....		962
Italy.....		4,777	Total.....		3,701
Spain.....		3,602	AFRICA.		MILES.
Portugal.....		641	Egypt.....		950
Denmark.....		783	Algiers.....		333
Sweden.....		2,465	Tunis.....		37
Norway.....		310	Cape Colony.....		65
Russia in Europe.....		11,525	Mauritius.....		66
Turkey in Europe.....		955	Total.....		1,451
Roumania.....		766	AUSTRALASIA.		MILES.
Greece.....		7	Victoria.....		563
Total.....		88,745	New South Wales.....		405
ASIA.		MILES.	Queensland.....		263
Russia in Asia.....		623	South Australia.....		196
Asia Minor.....		249	West Australia.....		40
Hindoostan.....		6,489	Tasmania.....		45
Ceylon.....		82	New Zealand.....		238
Java.....		162	Tahiti.....		2
Japan.....		38	Total.....		1,752
Total.....		7,643	CENTRAL AMERICA AND WEST INDIES.		
NORTH AMERICA.		MILES.	Honduras.....		56
Canada.....		4,484	Costa Rica.....		29
United States.....		66,640	Cuba.....		400
Mexico.....		377	Jamaica.....		27
Total.....		81,501	Colombia (Panama Railroad).....		47
			Total.....		559

The table was originally prepared by Dr. G. Stuermer, of Bromberg, Prussia; the figures for the United States for 1876, are from the "Railroad Gazette."

TO COAL CONSUMERS.

NEW YORK, April, 1877

During the coming season of 1877, I shall be pleased to receive your orders for any of the following popular Coals:

OLD COMPANY'S LEHIGH,

FROM SUMMIT HILL MINES,

Honey Brook Superior White Ash Lehigh,

PLYMOUTH WYOMING RED ASH,

WILKESBARRE COAL, (Baltimore Vein,)

DELAWARE, LACKAWANNA AND WESTERN CO.'S SCRANTON,

PHILADELPHIA & READING COAL & IRON COMPANY'S

Schuylkill Coals,

GEORGE'S CREEK CUMBERLAND COALS

From the well known Hampshire Mines.

GATE VEIN RED ASH COAL.

My friends throughout New York and New England may rely upon receiving the same uniform quality of coal, and promptness in filling their orders, as during past seasons.

Shipments made to all points accessible from New York, and at favorable rates of freight.

Address,

FRED. A. POTTS,

110 Broadway, New York.

33 Westminster Street, Providence, R. I.

Walter, Donaldson & Co.,

SOLE AGENTS FOR THE SALE OF THE FOLLOWING

COAL:

"THOMAS LEHIGH," AND GIRARD MAMMOTH,
Shipped from Port Richmond, and via Schuylkill Canal.

WYOMING AND WILKESBARRE,

Shipped from Elizabethport, and via Lehigh Canal.

111 BROADWAY, NEW YORK.

17 DOANE STREET, BOSTON.

205 WALNUT STREET, PHILADELPHIA.

G. B. LINDERMAN & CO.,

Sugar Loaf & Humboldt, Lehigh Coal,

OFFICE—50 TRINITY BUILDING,

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STEEL AND IRON WIRE ROPES,

For Mines, Inclined Planes, Wire Rope Tramways, Transmission of Power, Suspension Bridges, Ship's Rigging, etc., made by

The Hazard Manufacturing Company, Wilkesbarre, Penna.

This company has the Largest and Most Perfect Rope-making Machinery in the World. Capable of making ropes of any size, from Sash Cord to ropes sixty tons weight, without a splice.

NONE BUT THE VERY BEST MATERIAL USED.

These ropes are used more generally than any other throughout the Coal Regions. Reference is made to the Lehigh and Wilkesbarre Coal Company, the Riverside Coal Company, and others

For Prices, Instructions on the Use of Wire Ropes, and other Information, address

THE HAZARD MANUFACTURING COMPANY,

Wilkesbarre, Penn.

R. H. WILLIAMS,

ANTHRACITE AND BITUMINOUS COALS,

Sole Agent for the

"Black Mine," Red Ash Coal.

FORMERLY KNOWN AS THE SPOHN VEIN.

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Pea and Dust Coal a Specialty.

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SHIPPERS OF

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Steamboats and Tugs may be coaled with despatch at any hour day or night, at our coal wharf, foot of Sixth St., Hoboken, N. J.

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Lehigh Red Ash Coals.

SUPERIOR IN QUALITY AND PREPARATION.

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CAMPBELL TUCKER & Co.,

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ANTHRACITE AND BITUMINOUS

COAL.

Best varieties of Coals and Cokes, for iron, railroad, general manufacturing and domestic uses.

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H. H. SHILLINGFORD, Pres't.

H. T. SHILLINGFORD, Sec. & Treas.

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MINERS AND SHIPPERS OF

CLEARFIELD COAL

For Steam, Rolling Mills, Blacksmithing, Glass Works, Brick
and Lime Burning, Coking.

General Office, 125 South Fourth St., Philadelphia.

SHIPPING PIERS,

Greenwich Point, Phila.; So. Amboy, N. J.; Canton, Balto.

THE KITTANING COAL COMPANY

Own about *eight thousand acres* and control by lease about *one thousand acres* of Bituminous Coal territory in what is known by geologists as the Moshannon Coal Basin, in the counties of Clearfield and Centre, State of Pennsylvania, and which is designated in the recent report of the second Geological Survey of the State, as the *Steam Coal Basin of Clearfield County*. The territory lies on both sides of the Moshannon stream, which is the dividing line between the two counties named, and the dip of the coal on both sides of the Valley being towards said stream. There are known to exist on the property five explored beds of coal, laid down by geologists as *A, B, C, D* and *E*. The bed *B*, as mentioned in the State Geological Survey report, but by other geologists laid down as *D*, is the only one at present developed and worked by the Company; it is about five and a half feet in thickness, of pure, clean coal. The Geological Survey Department of the State gives the following analysis of the coal. Water at 225° F., .670; Volatile matter, 21.360; Fixed Carbon, 74.284; Sulphur, .435; Ash, 3.251. Coke per cent., 77.97. Color of Ash, cream.

The following remarks are appended to the analysis: "The coal is undoubtedly a most excellent one, and admirably adapted for STEAM PURPOSES as well as for use in IRON MANUFACTORIES."

Charles A. Seely, Chemist, of New York, gives the following analysis of the same coal: "One hundred parts contain: Volatile combustible matter, 20.0; Fixed Carbon, 76.39; Ash, 3.51. Coke, 89.09. The sample contained of sulphur, 0.19. The reports of the consumers of this coal of its practical working result, shows more favorably its superiority than the foregoing analyses indicate.

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CANNELTON COAL CO.

OF WEST VIRGINIA.

Offer for sale the following Coals from their colliery at CANNELTON, Kanawha County, West Virginia, shipped at Richmond, Va.

CANNELTON CANNEL

acknowledged to be the BEST ENRICHER produced in this country, a gross ton yielding **10,000** cubic feet of Gas, **61.54** candle power. Coke 32 Bush., good quality.

CANNELTON CAKING COAL.

a superior Coal for Gas manufacture, a gross ton yielding **10,700** cubic feet of Gas, of **16¹⁴⁻¹⁰⁰** candle power. Coke **41** Bushels, weighing **1,455** lbs., good quality. Sulphur, $1\frac{1}{4}$ per cent. and Ash 2 per cent.

CANNELTON SEMI-CANNEL,

producing **11,220** cubic feet of Gas—**22** candle power—**1,300** lbs of Coke.

SPLINT AND BLOCK COALS,

These are superior House or Steam Coals—making little or no slack in transportation excellent substitutes for Cannel for use in open grates.

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The Westmoreland Coal Co.

(CHARTERED 1854.)

Mines situated on the Pennsylvania and the Connellsville Railroads, in Westmoreland County, Pennsylvania.

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PIER No. 1 (upper side,) SOUTH AMBOY, N. J.

Since the commencement of operations by this company its well-known

BITUMINOUS COAL

has been largely used by the Gas Companies, Railroads and Iron and Steel Works in New England and Middle States, and its character is established as having no superior for freedom from sulphur and other impurities.

Principal Office, No. 230 South Third Street,

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CROSS CREEK COAL

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Orders solicited. Coal shipped at Port Johnston, N. J., promptly and in good order.

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WHARVES AT LOCUST POINT, BALTIMORE, GEORGETOWN. D.C. and
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The Cumberland Coal Region is one of the most important of the

BITUMINOUS COAL

Regions in America, on account of the GOOD QUALITY OF ITS COAL, THE UNUSUAL SIZE OF ITS BED and the large amount of its production.

The demand for this coal is shown in the fact that for the last twenty years the production has been an increasing one, until the aggregate is now some
30,432,209 Tons.

This coal has a world-wide fame as an iron making and steam coal. It is supplied to nearly every European and coast-wise steamer leaving the port of New York. Every Railroad south of Pennsylvania and east of Albany, New York, uses this coal in locomotives. It is extensively used for steam purposes generally. It is burned upon most of the Ferry Boats, and in a great number of the factories, foundries, glass works, etc., in New England and New York.

ITS SUPERIORITY

for all these various purposes of manufacture and commerce is generally conceded. The lands and the mines of the

New Central Coal Company,

are located on the George's Creek, in the heart of the region, and the coal produced and shipped from their

BIG VEIN AND KOONTZ MINES

is recognized as having no superior in quality in this country.

Orders solicited from dealers and consumers, which will be shipped either from Baltimore, Georgetown, South Amboy or Hoboken.

Prompt deliveries may be relied upon, of First-class Fresh Mined Coal.

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Hard and Free Burning White Ash Coal,
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Will either exhaust air from, or force it into the Mine as required. Capacity, 50 to 500,000 cubic feet of air per minute, according to size, requiring but one horse power for each 10,000 feet.

This Ventilator, with its Engine, comes much cheaper than any other Fan and Engine now in use, of the same capacity. Several of these Ventilators are in successful operation. Send for circular. Award granted at the Centennial Exhibition in Groups 1 and 20. Address,

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The following are a few of the very satisfactory reports that have been received from customers.

PENNSYLVANIA STEEL WORKS.—"Superior to much of the coal from the district, and inferior to none."

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NORRISTOWN IRON WORKS.—"Gives entire satisfaction, used for years."

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Further reference is made to the Architectural Iron Works, Quintard Iron Works, the Morgan Iron Works, New York City, who use this coal exclusively. Also to the Charleston S. S. Co., and Morgan and West India lines of steamers, and others, which want of space prohibits quoting.

S. H. BROWN & CO.,

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NORTH FRANKLIN Red and White Ash, and SUSQUEHANNA COAL

COMPANY'S Red and White Ash Coals, also, other SCHUYLKILL,

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Shipments made at SOUTH AMBOY, N.J., and DELAWARE CITY, Del.

GENERAL COAL AGENCY
OF THE
CHESAPEAKE AND OHIO RAILROAD CO.,
For the sale and distribution of the superior
CANNEL,
SPLINT,
GAS and
STEAM
COALS,
FROM THE
Kanawha and New River Coal Regions
ON THE LINE OF THE
CHESAPEAKE AND OHIO RAILROAD,
IN WEST VIRGINIA.

The CANNEL COALS of the Kanawha Valley have been long and favorably known, and extensively used for enriching purposes by gas light companies, and are recognized as the best Gas Enriching Cannels in the market.

A series of practical tests recently made of the KANAWHA CAKING COALS, offered for sale by this Agency from five of the principal mines in the Kanawha Valley, gave the following average results per ton of 2,240 pounds, viz. :

	CUBIC FEET	CANDLE POWER.
Standard Yield.	10,000	17,414
Maximum Yield.	12,425	16,010
Bushels of Coke.		33 4-5
Pounds of Coke.		1,515 3-10

COKE OF GOOD QUALITY.

These tests were made under the observation of Prof. Ricketts (School of Mines), with ordinary average samples of 2,240 pounds, from each of five different mines, making a total of five tons, with the regular working charges of 224 pounds each, in the practical apparatus of a Gas Light Company. They can be relied upon as fairly exhibiting the character and value of these coals, and will be borne out in actual working in as full proportion as similar tests of other standard Caking Coals.

The chemical analysis of the above five samples, by Prof. Ricketts, give the following average results, viz. ;

Volatile Matter.	35.75	per cent.
Fixed Carbon.	56 65	" "
Ash.	5.18	" "
Sulphur.	1.32	" "
Moisture.	1.08	" "
Specific Gravity.	12.79	
Weight of one cubic foot.	79.75	lbs.

These coals are offered to manufacturers of Gas, with the fullest confidence that their practical working in large quantities will confirm and sustain the foregoing results, in the full proportion that other standard Caking Coals work up to similar tests.

Single cargoes furnished for early use, or for trial, and contracts for the season of 1877, made on favorable terms.

The KANAWHA SPLINT COAL has been extensively introduced during the past season for DOMESTIC USE IN OPEN GRATES, and has become very popular as an economical and superior blazing fuel. Dealers supplied by the Cargo, or in their Carts, on favorable terms.

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RICHMOND, VA.

A. S. HATCH,
General Manager,
C. & O. R. R. Coal Agency,
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PENN GAS COAL COMPANY

OFFER THEIR COAL

CAREFULLY PREPARED & SCREENED FOR GAS PURPOSES.

Their property is located in the Youghiegheny Coal Basin, near Irwin's and Penn Stations, on the Pennsylvania Railroad, and on the Youghiegheny River,

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PLACES OF SHIPMENT,

Pennsylvania Railroad Pier, No. 2, (lower side),

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Wholesale Coal and Iron Merchant,

OLD COMPANY LEHIGH from Summit Hill Mines, HONEY BROOK SUPERIOR
WHITE ASH LEHIGH, FULTON LEHIGH, PLYMOUTH WYOMING,
RED ASH, WILKESBARRE COAL, (Baltimore Vein.)
DELAWARE, LACKAWANNA AND WESTERN CO.'S SCRANTON,
PHILADELPHIA and READING COAL and IRON COMPANY'S SCHUYLKILL
COAL, GEORGE'S CREEK CUMBERLAND COAL, from the well-known
HAMPSHIRE MINE. GATE VEIN RED ASH.

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No. 33 Westminster Street, - - - - - Providence, R. I.

OLIVER'S POWDER.

THIS POWDER RECOMMENDS ITSELF ON ACCOUNT OF
Its SUPERIOR STRENGTH.
AND
FREEDOM FROM SMOKE.

NOW IN USE IN THE

Coal Regions of Pennsylvania

Direct Orders to PAUL A. OLIVER, Wilkesbarre, Pa.

PROVINCIAL GAS COALS.

THE UNDERSIGNED ARE PREPARED TO
EXECUTE ORDERS FOR THE

Block House,
International,
Glace Bay,
Caledonia ^{and}
Lingan Coals.

For delivery at any port in the United States, West
Indies, or South America.

PERKINS & JOB,

91 State Street, Boston.

27 South Street, New York.

LACKAWANNA COAL.

Delaware and Hudson Canal Co.

GENERAL OFFICES:

COAL AND IRON EXCHANGE,

Corner Courtlandt and New Church St.,

NEW YORK.

Thomas Dickson, President,

R. G. Moulton, General Sales Agent.

Lehigh Valley Coal Company,

MINERS AND SHIPPERS OF

**SPRING MOUNTAIN,
SPRING BROOK, JEDDO,
HIGHLAND, AND
PHILADELPHIA COAL CO.
[LEHIGH,]**

WYOMING, (Baltimore Vein,)

FRANKLIN, (Wilkesbarre,) and **CENTRALIA.**

Office, cor. Cortlandt & Church Sts.,
Coal and Iron Exchange Building, New York.

GEO. B. NEWTON, Agent.

PITTSTON COAL.

PENNSYLVANIA COAL CO.

TRINITY BUILDING,

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Sec'y and Treas'r.

W. H. MEEKER,

MINER AND SHIPPER OF

OF

Lackawanna and Wyoming Valley

COAL,

111 Broadway, - - New York.

The attention of dealers and consumers is invited to the following varieties of Coal

OF WHICH I HAVE THE EXCLUSIVE SALE.

Lackawanna Valley,

FREE BURNING WHITE ASH.

Kingston,

WYOMING WHITE ASH

Chauncey,

WYOMING RED ASH.

ALSO,

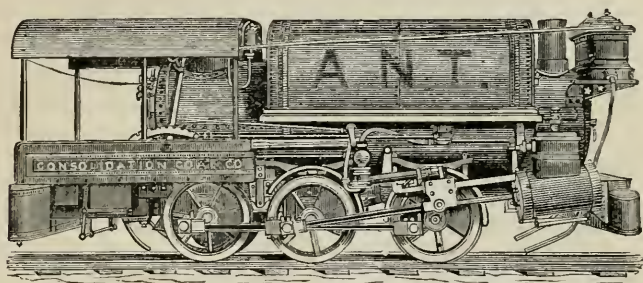
Beaver Brook,

LEHIGH WHITE ASH.

Shipments made at Hoboken, N. J., always accessible and
advantageous in point of freight charges.

Vessels and Boats Chartered at the Lowest Rates and Prompt
Despatch given in Loading.

PORTER, BELL & CO.



PORTER, BELL & Co. make Light Locomotives, their exclusive specialty, and have a great variety of sizes and styles, from five to twenty tons weight and twenty-eight to sixty inches gauge of track, at work at coal, iron, lumber and other operations and on narrow gauge railroads throughout the United States, and in Canada, Cuba, and South America

The running expenses of a Mine Locomotive including wages, fuel, repairs and interest, are about the same as of three mules and three drivers, and the work done from three to ten times greater; keeping up footpath while works are running, and feeding mules when works are shut down, are other disadvantages of animal power.

Mine Engines with 4 or 6 Drivers, and Outside or Inside Connections. Conforming to Entry.

PHOTOGRAPH and PRICE OF ENGINE to do SPECIFIED WORK furnished on APPLICATION.

OFFICE—5 Monongahela House.)
WORKS—A. V. R. R. 49 and 50 Sts. }

PITTSBURGH, PENNA.

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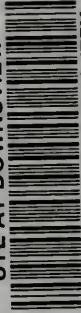
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